# WIRE & WIRE PRODUCTS

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(Patent Pending)

Maximum temperatures of wire on finishing block

| H.P. Absorbed | Temperature |
|---|---|
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| 25 | 125° |
| 15 | 115° |

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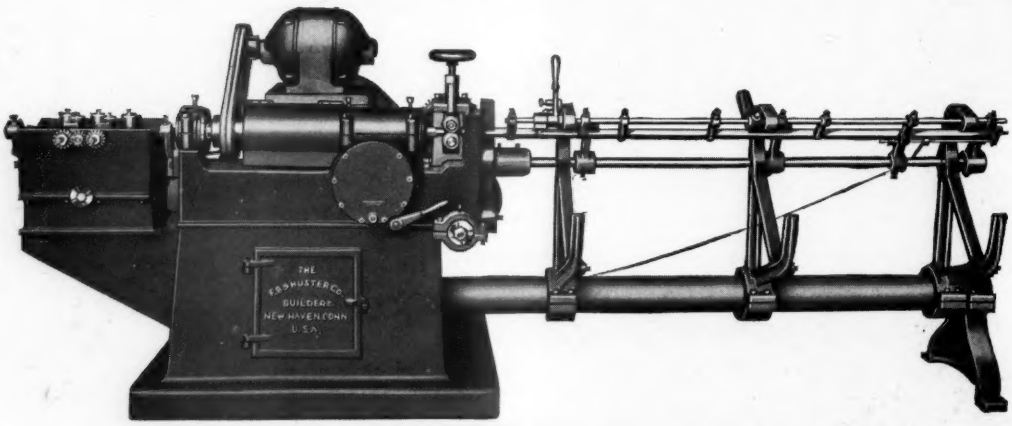
# MORGAN WORCESTER

ENGINEERS AND MANUFACTURERS

February 1930

# SHUSTER

## Automatic Wire Straightening and Cutting Machinery

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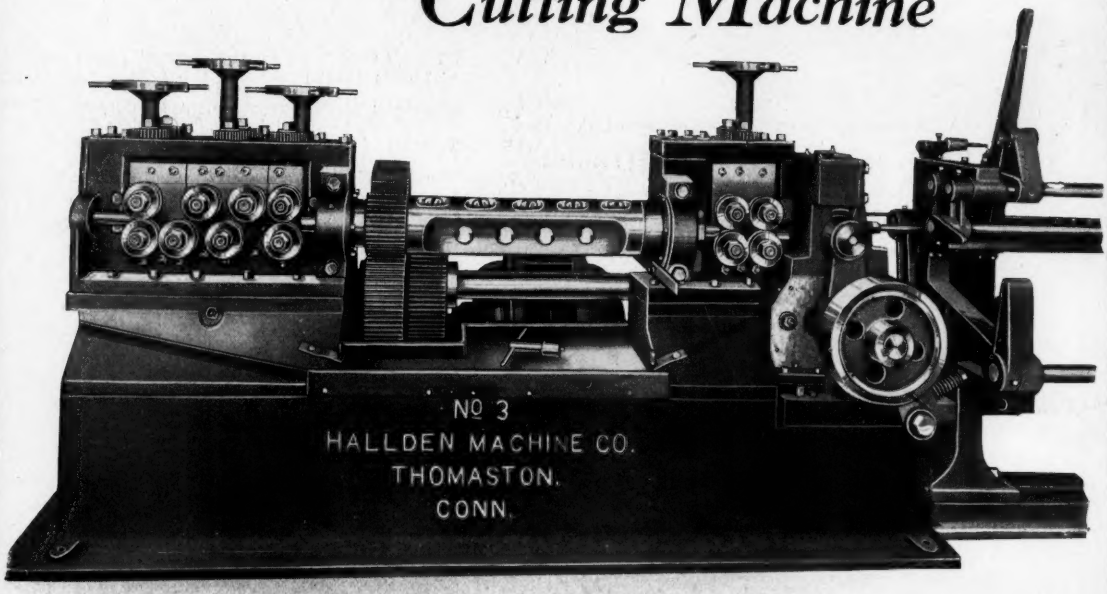
# Hallden

## *Flying Shear Automatic Wire Straightening and Cutting Machine*

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VIII. The Effect of Heat Treatment After Cold Work
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SOMETIMES a simple story carries a huge moral. As a portrait painter sat in a Paris cafe sipping wine, his eye fell on a newspaper with a headline "Hard Times Are Coming." "So, he said to himself, that means that we must economize." He called for his bill instead of a fresh bottle. The proprietor, knowing his habits and surprised that he did not order the second bottle, asked about it. "The wine is excellent, said the artist, but hard times are coming and I must economize."

"Ah, said the storekeeper, as he called his wife. You must make cotton do instead of that new silk dress. The artist says hard times are coming. We must economize. Cancel your order."

When the storekeeper's wife cancelled her order, she told the dressmaker why and said that they would all have to prepare for hard times. As soon as she had gone, the dressmaker crossed the street to the contractor's shop. "Hard times are coming. This is no time to expand. The improvements must wait. Do not proceed with the work. I must economize."

When the dressmaker left, the contractor sat down and wrote: "My dear artist friend—I must postpone sitting for my portrait. We are going to have hard times and I think it best to wait until things are more settled."

The next day, when the artist received the letter, he betook to the cafe and ordered a small bottle to soothe his feelings. As he sat there his eyes fell on the newspaper he had seen before. He picked it up and scanning it more closely, discovered that **it was two years old.**

However, the damage was done, in fact was proceeding all over the city at a rapidly increasing rate since each, as the word about 'hard times' reached him, curtailed everything he had previously planned and passed along the doleful word to dozens of others.


# WIRE & WIRE PRODUCTS

A monthly publication devoted to wire drawing and wire forming

Vol. 5 February 1930 No. 2


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551 Fifth Avenue, New York City. Telephone: Murray Hill 10191

Publication Office: Washington, N. J.

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**NEW YORK**

WIRE & WIRE PRODUCTS

Vol. 5 FEBRUARY, 1930 No. 2

# Drawing Rhodium Wire

## Details of Processes to Be Followed with This Exceptionally Hard, Tough, Dense Metal

*By William H. Swanger*

*For years it has been considered that rhodium, a member of the platinum group of metals, was unworkable. It has been used as a hardener for platinum, itself fairly hard, and the two have been united usually by the oxy-hydrogen blow pipe. Wire of a fibrous structure has now been produced, through a series of swaging operations at gradually decreasing temperatures, starting at 800 deg. C. at which it can be forged.*

ALTHOUGH rhodium has been known since 1804, when it was discovered by Wollaston, its use has been limited almost entirely to the platinum-rhodium alloys for thermocouples which contain 10-13% rhodium. The lack of application to other uses has been due to its scarcity, only 1% being found in and extracted from crude platinum, its chief source of supply. Stock of rhodium (plus ruthenium and osmium) in refiner's hands at the end of 1927 was 4,369 oz. compared with 68,000 oz. platinum. Aside from its scarcity, difficulties of fabrication have kept it from the list of industrially-useful metals.

Pure rhodium sponge was used as the basis of preparation of rods and wires, this being prepared by heating commercial or crude rhodium in finely divided form with sodium chloride in an atmosphere of chlorine gas to a temperature of 600 deg. C. The partially fused mass of sodium rhodium chloride was dissolved in water and this solution boiled with an excess of sodium nitrite, converting the rhodium to the soluble sodium rhodium nitrite. Sodium sulphide was added to remove lead impurities. Platinum and palladium were precipitated. After filtration a saturated solution of ammonium chloride was added to precipitate ammonium rohodium nitrite. As this was not suitable for reduction to sponge by ignition, it was converted to ammonium rhodium chloride. This, after repeating the process to produce a product of purity, was ignited in air and the somewhat oxidized sponge thus obtained was reduced in hydrogen. Rhodium sponge produced by this process shows no impurities, except for traces of iridium.

### How the Rhodium Was Melted

The first melts of pure rhodium were made with a "hard" (oxygen rich) oxyhydrogen flame, the rhodium being held on a block of hard-burned lime. It was found desirable to press the rhodium sponge into pellets in a steel mold before melting.

As soon as rhodium melts in the oxyhydrogen flame it begins to spit, small beads of metal are thrown off very rapidly, and when the melt freezes large excrescences form on the surface, presumably due to the evolution of gases which have been absorbed from the flame by the molten metal.

By reducing the flow of oxygen to the melting torch, this spitting of rhodium can be avoided to a considerable extent and the metal made to freeze with a fairly smooth surface. It is, of course, realized that a flame of this type—that is, a soft flame rich in hydrogen—may reduce lime at the temperature of molten rhodium, and introduce calcium into the melt. However, by proper manipulation of the flame, only the upper portion of the metal is melted at any one time, and the

(*Please turn to page 41*)

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liquid metal can be kept out of contact with the lime while exposed to this soft flame. A button of rhodium melted in this manner can be lifted from the lime block cleanly with no adherence of lime to the metal.

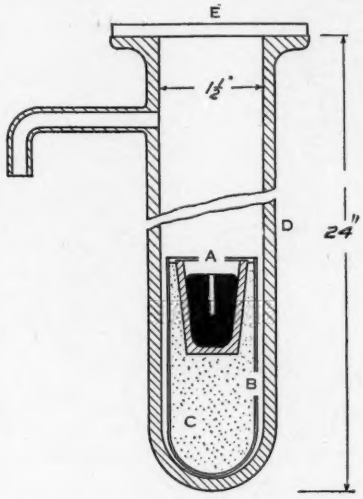
### Melting in the High-Frequency Induction Furnace

The melting of rhodium sponge in the high-frequency induction furnace with access of air presents somewhat the same difficulties as does melting on lime with the oxyhydrogen flame. The sponge must be compressed to a density sufficient to heat readily from the induced current. If the pellets are heated in air to a bright red and then allowed to cool to room temperature, the sponge will be oxidized to such a degree that it can not be heated readily in the high-frequency furnace. By heating and cooling in hydrogen such oxidized rhodium sponge can be reduced to clean metal which will then heat easily in the induction coil.

Molten rhodium in an open crucible in the induction furnace spits badly, and if the furnace current is shut off suddenly, so that the metal freezes rapidly, large blisters will grow out from the surface. By proper manipulation of current the metal can be frozen slowly so that a minimum of blistering occurs, and forgeable ingots are obtained.

The first melts in the induction furnace were made in zirconium oxide crucibles similar to those used for melting pure platinum. However, it was found that this softened at the temperatures sometimes attained in the molten rhodium. Nevertheless, it broke away cleanly from the frozen metal and with care could be used for the melting of rhodium. One attempt to cast the molten rhodium into a graphite mold was unsuccessful as most of the metal was ejected from the mold by the rapid evolution of gas on sudden freezing.

Thorium oxide crucibles were found most satisfactory for melting pure rhodium in the procedure finally adopted; that is, melting in vacuum in the high-frequency induction furnace. For the preparation of these crucibles pure thorium oxide was fused in the electric arc in a stream of oxygen. The fused thoria was ground in a steel-ball mill, and was then treated with hydrochloric acid to remove iron. The acid-washed fused oxide was mixed with a small amount of thorium chloride solution, and this mixture was pressed or tamped in suitable molds designed to form a crucible with a wall thickness of about 3 mm. The molded crucibles were dried and fired to 1,700° to 1,800° C. in an Arsem furnace. Care had to be taken




*Vacuum furnace assembly for melting rhodium by high-frequency induction*

to avoid direct contact between thoria and graphite at temperatures much above 1,200° C. Thoria crucibles prepared in this manner are very dense and possess considerable strength. They have been used to melt platinum metal alloys at temperatures up to 2,200° C.

Melts in vacuum were made in thoria crucibles at a pressure of 0.05-1.0 mm of mercury. Rhodium melted under these conditions froze with a smooth surface of a silver-white color. Ingots of maximum density reported for rhodium have been obtained in this way.

### Forging and Swaging Rhodium

The vacuum melts of rhodium weighed usually about 50 g. each were made in thoria crucibles. These were allowed to freeze in the crucibles. The ingots were about 20 mm. long. The shrinkage cavity generally extended over so large a portion of the length of these small ingots that satisfactory forgings could not be made from them.

Several vacuum-fused ingots broke up when forging was attempted. The crystals of these ingots were very large—up to 5 or 6 mm across— and fractures appeared to be intercrystalline. On the other hand, a number of ingots prepared in apparently the same way from the same lot of rhodium sponge and having just as large crystals were forgeable. It has not yet been found possible to control the forgeability of the vacuum-fused metal.

Vacuum-melted ingots remelted on lime with the oxyhydrogen flame, however, always proved forgeable and this procedure was followed in preparing roads and wire. The forging on swaging of the remelted rhodium ingots did not present any unusual difficulties. These ingots could not be forged at room temperature, but became quite malleable above a red heat.

For the production of wire the ingots were hand forged at 1,100° C. to bars of a shape and size (diameter of 10 mm) suitable for swaging. The bars were heated in an oxygas or oxyhydrogen flame and entered the swaging dies at 1,000° C. A rotary swager operating at 400 r. p. m. was used for bars from 10 to 1.8 mm. in diameter. A smaller machine, operating at 600 r. p. m., was used for further swaging to 1.0 mm. Although dies were available for this machine to produce wire of 0.8 mm. diameter, it was found that the machine would not pass the wire through fast enough to prevent its cooling below the temperature at which it was malleable. Consequently the

hot swaging of rhodium wire of any considerable length was not carried to sizes below 1.0 mm.

A piece of 1 mm. wire about 35 ft. long was prepared by hot swaging to be used as a winding for a resistance furnace in a study of certain reactions at temperatures higher than could be obtained in a platinum-wound furnace. This wire was wound on a grooved alundum tube 1.5 in. in diameter with six turns per linear inch. It was heated to a red heat with a gas flame as it was wound on the tube. The furnace has been kept at a temperature of 1,875° C. for 4 hrs., although it is not intended to be used regularly at temperatures quite this high.

**Drawing of Rhodium Wire**

The rhodium wire produced by swaging at 800° C. or over was not ductile at room temperature. It could not be straightened out from a sharp bend without fracturing, nor reduced in diameter by cold-drawing. The fracture appeared coarsely crystalline. The end of a piece of such wire could be flattened on an anvil to half its thickness by one sharp blow with a hammer, but fractured when the same thing was attempted with several light blows.

It was thought that if a fibrous structure could be imparted to the hot-swaged wire it might become ductile. In view of the results obtained in the hot-drawing of rhodium this probably could be accomplished during swaging by gradually lowering the temperature of the wire as it is passed through the successively smaller dies until finally it might be swaged at a temperature considerably below a red heat or cold-drawn at room temperature. However, there was not enough material available for much experimental work along this line.

Recently, through the courtesy of Dr. S. L. Hoyt, of the General Electric Research Laboratory, a set of tungsten carbide wire drawing dies, covering the range 0.41 to 0.020 in., was made available to the bureau. These dies can be used at a red heat. A piece of wire which had been hot-swaged to a diameter of 1 mm. was successively drawn through this series of dies to approximately 0.5 mm. (0.020 in.) in diameter. The dies were kept at 600° C. by means of a gas burner. The wire was heated somewhat hotter (600° to 800° C.) as is passed through the die for the first three or four steps in reduction, but the temperature of the wire was gradually lowered until, for the last three or four dies, the wire was well below a red heat. The wire was lubricated by dipping it into a suspension of fine graphite in oil before each pass through the die. After this hot drawing operation the wire, now 0.020 in. in diameter, was drawn through a set of jewel dies at room temperature, without any annealing, to 0.0144 in. The resulting wire was ductile and could be bent sharply and straightened, coiled on an 8-in. rod, and twisted tightly upon itself without breaking, all at room temperature. It is quite probable that drawing at room temperature could be continued to wire of still smaller size. It is thus demonstrated that rhodium which has heretofore generally been reported as unworkable can be made ductile.

**Melting Point of Rhodium**

One of the most useful applications of rhodium wire appeared to be for windings for high-temperature furnaces or heaters. Rhodium has a melting point considerably higher than platinum and like platinum does not readily oxidize or volatilize in air at high temperatures. In this connection it seemed advisable to redetermine the melting poin of rhodium. The fiures generally given in the literature for the melting point of rhodium, namely, 1,950° or 1,955° C., were based on determinations made on metal which was probably not of the highest purity.

A number of determinations of the melting point of rhodium were made. An Ajax-Northrup high-frequency induction furnace was used for melting the rhodium. The arrangement is shown in Fig. 1. The metal was melted in a thoria crucible, A, within a closed-end fused silica tube, D, which was evacuated. For heat insulation, ignited, but not fused, powdered thorium oxide, C, was packed about the crucible. An alundum extraction thimble, B, was used to hold the heat insulation and crucible inside the silica tube. The top of the silica tube was closed with the clear fused-silica cover plate, E, whose absorption correction had been determined. The melting was carried out at pressures below 1 mm. of mercury, with a liquid-air trap between the mechanical vacuum pump and the melting chamber. Temperature measurements were made with a Leeds & Northrup optical pyrometer sighted into a 2 mm. hole drilled in the ingot to a depth of 10 to 15 mm.

The pyrometer was calibrated in the bureau's pyrometry section, and in addition was checked at the gold point and at the melting point of platinum using the same high-frequency furnace set-up that was used for determining the melting point of rhodium.

The temperatures corresponding to the melting points were determined both by plotting time-temperature heating curves and by observing the temperature at which the hole in the ingot filled with liquid metal. The flat portion of the heating curve for each melt extended over a period of at least 2 min. during which time about 10 readings were taken. In all satisfactory experiments the last temperature reading obtained before the hole in the ingot filled was the same as the temperature corresponding to the flat portion of the heating curve.

On two separate ingots, with the best black body conditions in the sight holes, the values for the melting point were

(*Please turn to page 56*)

# Hazards of Inter-Department Trucking

## How Material Is Trucked Through the Plant and the Dangers to Workmen That Accompany This

*By R. F. Thalner*

*Safety Director, Buick Motor Co., Flint, Mich.*

THE transportation of stock from one machine to another and from one department to the next and thence to the assembling or shipping point is a problem which must be given the most serious consideration from the safety as well as the production standpoint. Any system of transportation which causes accidents to men or damage to trucks and equipment is unsafe and inefficient, and sooner or later will come to the attention of the management through abnormal costs of maintaining it.

Every plant has its own individual design of trucks to suit the particular product which is to be transported and for that reason each one of those plants must solve its own problems regarding design because trucks which would be adaptable for use in an automobile plant might not operate successfully in a steel mill or a bread making factory.

In addition to the special and individual design of trucks a great deal of consideration and attention must be given to the different kinds of stock that must be moved. Goods will vary to such an extent that a great deal of forethought is necessary in the design and construction of the trucks that are to handle each type of product. Sand, coke, lumber, brick, machine parts, sheet metal stock and castings each must be dealt with in its own sphere and the equipment to handle it must be so constructed that it will best serve the purpose for which it is intended. If stock is to be used in multiples of one, two, three, etc., the manner and number of pieces for loading on each container should be arranged to conveniently hold that number of pieces.

It is interesting to note the evolutin of this particular branch of our industries. Going back into the earlier history of manufacturing, we find that inter-departmental trucking was done mostly by hand while trucking outside of the factory was carried on by the use of teams and wagons. The hand truck, of course, presented some hazards because it involved the use of equipment which was cumbersome and difficult to handle when loaded. Bearings or wheels did not run as freely and smoothly as they do now in the same type of truck, and close attention was not given to keeping trucks of this type, that became worn rapidly, in good running condition. The class of help engaged to carry on this work was not required to do anything more than ordinary labor and consequently that kind of work would not attract the best kind of help.

Probably one of the oldest methods of trucking by hand is the use of the wheel barrow which has never been a real hazardous article to use. The worst features is strains, etc., occassioned by overloaded or improperly balanced equipment. The scraping of knuckles while going through narrow passages or doorways is another minor condition which has given some trouble. To eliminate this condition, knuckle guards have been placed on the handles of wheel barrows which make it impossible for the men who handle them to bruise themselves while going through narrow doorways, near piles of stock or other trucking equipment which they might be passing. It is a very simple and minor contrivance to put on and will eliminate this type of injury.

Another condition which is hazardous with regard to wheel barrows is brought about by the men who are using them not being careful of other men who may be working below them under scaffolding. Wheeling brick, mortar, stone and other construction materials on scaffolding should be attended with the utmost caution because serious accidents can result from lack of attention.

Taking loaded wheel barrows down inclines is sometimes done at a risk of the contrivance getting away from the man. A very simple manner of eliminating it is to place a piece of channel iron in the middle of the runways so that the wheel will be guided in the proper direction.

Going from the wheel barrow, which is a one-wheel truck, to the next stage we find another of the old types of hand trucks still in service—the "baggage smasher" truck, a two-wheel affair used primarily for hauling trunks and freight. Accidents have resulted from the use of this contrivance by hav-

ing loads not properly balanced and also by hauling them over floors or platforms which are not smooth. The installation of a brake on the wheels of these trucks will enable the operator to pivot on the wheels which loading and unloading. This will eliminate many of the accidents which result from this operation. The installation of larger wheels has also done away with the trouble which was encountered when the small wheels were used on rough floors. There is not the possibility of the operator losing control of his truck with larger wheels as there was with the old smaller size type.

With these two trucks, design has had a great deal to do toward making them safe or unsafe because they both depend upon proper balancing of loads and ease of operation after being loaded to make them safe and efficient.

Passing now to the platform type we come to a truck which has been a source of some trouble and annoyance. It is the four-wheel type, having two large wheels located approximately one-third of the distance fom the end of the truck, and two small casters at the other end of the truck where the handle is attached. The danger with this type of truck has been that when loaded improperly, so that there is an overhang, it is possible for it to upend and cause damage. The overhanging load causes the truck to rotate about the axle of the large wheels as an axis, forcing the front end up and forwad. In fact, a case is on record where a load of sheet metal on one of these trucks was overhanging to such an extent that the front end flew up and the sliding sheet metal shot the truck forward, catching the operator between the truck and the wall, crushing and killing him. The manufacturer probably gave no thought to this serious hazard because the big wheel was placed in that location chiefly to take the greater part of the load and thus make the truck run easier. Moving this wheel closer to the end and substituting larger casters in front so that they can take an increased share of the load and have all wheels provided with roller or ball bearings will take away much of the hazard of this type of hand truck. Another method is to leave the large wheels where they are and place two stationary legs on that end of the truck so they are three inches or so from the floor. Then if the truck attempts to upend, the legs will limit the movement.

These three types of hand trucks were and are still used extensively in all manufacturing establishments for inter-departmental trucking but as progress is constantly being made, new and better means have come into existence.

The constant competition in business has made it necessary that costs be reduced wherever possible. This condition linked with the increased use of electric and gasoline motors has gradually brought about a new condition. With the advent of the automobile and consequent elimination of teams and wagons and the minimizing of hand trucking, the use of trucks and tow motors of the gasoline and electric type has increased. The electric truck and the electric tow motor are two appliances used very much today and due to the prevalence of this type of transportation equipment it seems quite necessary to deal with it at great length. The ordinary electric truck, capable of transporting two tons of material, weighs about 3,000 pounds, almost as much as a good automobile. Operators and employees are deceived in estimating the weight of such trucks because of their compactness. They also forget about the enormous weight of the battery used to operate such a truck. Keeping in mind the fact that the electric truck, although smaller and more compact, weighs as much as a good sized automobile, and also keeping in mind the fact that this piece of equipment runs through the aisles in a shop where men are constantly walking to and fro, it is quite necessary that we recognize the danger which may result through careless operation.

If automobile drivers were careful we would have very few accidents and consequently if all electric truck operators are careful we will have very few accidents. This brings to light the necessity of having careful operators, and careful operators can only be had by hiring careful men and impressing them with the importance of running their trucks in a careful way. All electric truck operators should pass an examination and be licensed as to their qualifications for using this equipment. Such methods have been tried out and are proving very effective. Wherever systems have been installed for licensing these men, a noticeable reduction in severity and frequency of accidents has resulted. Not only has this reduction been made but repair departments have noticed a falling off in maintenance work which was fomerly necessary to keep trucks in repair. A man who operates a truck carefully to avoid accidents, automatically takes better care of his equipment also.

When an electric or tow motor truck is used for hauling trains of stock, it is quite essential that the trailers making up this train be securely attached to each other so that there is no possibility of a train breaking while in motion. Each trailer should have a safety coupling which will prevent it from unhooking while in motion. This not only applies to trucking inside factories but also to that outside of the building. The container for holding stock on these individual trailers should be secure and so arranged that no stock can shake or tumble loose while the trailers are in motion. Overloading of these trucks or "heaping up" of the stock should not be permitted.

(*Concluded in March issue*)

# Galvanic Coating of Wire With Cadmium

## Perfect Rust-resistance—Current Densities, Deposits and Electrical Calculations

*By Dr. Oscar Hahn*

CURRENT interest in cadmium and its wider uses in manufacturing has brought a large number of inquiries concerning the production of iron and steel wire with cadmium coatings. As we have a very simple process we are in a position to answer those inquiries by simply describing our plans.

The galvanizing of iron and steel wire requires relatively large plants because the wire must be drawn through the bath singly. This necessitates a comparatively expensive winding and unwinding equipment, as well as relatively large baths. When coating with tin, brass and some other metals, because of the good distributing qualities of the metal bath, it is possible to carry on the work using bundles of wire. The manager of our Iserlohn branch has supervised the installation of a number of such plants. As a rule it has been more a question of facilitating the drawing of the wire by such coatings, thereby saving the drawing tools, but with a coating of cadium, a quite different end is sought, namely the extraordinary-high rust-resisting property. This is considerably greater than with any other kind of galvanizing.

### Cadmium's Suitable Properties

The properties of cadmium particularly its position in the electromotoric tension series and its great ductility enable cadmiumized wires to be apparently suitable for making wire gauze. Owing to the position they occupy in order of electromotoric tension a rust resistance is obtained such as has never hitherto been reached. The greatest protection against rust is hitherto provided by stove zincing which however after 650 hours treatment in a so-called salt spray process shows the first formation of rust. The salt spraying process consists in bringing the material, the rust resisting properties of which are to be tested, into a room in which cooking salt solutions are continually atomized, owing to the action of the cooking salt on the one hand and the continual wetting with water on the other hand a condition is reached which favors the formation of rust to an extraordinary high extent. It has been found that articles coated with cadmium show no formation of rust even after 1860 hours. This proves the fact that cadmiumizing is far superior to stove zincing.

I have found by rust testing that a coating of 15 gr. per sq. meter is sufficient for wire in order to ensure a reliable protection against rust by slight influences. For stronger influences it is advisable to select a coating of 25 gr. of cadmium per sq. meter. As 1 amp-hour is capable of depositing about 2 gr. of cadmium 7.5 to 12.5 amp-hours must be reckoned per sq. meter, according to the strength of the influence which corresponds to a current of 4.5 to 7.5 amperes per minute per sq. decimeter. The duration for galvanizing is dependent upon the density of the current chosen. This current density can be selected for stationary wires up to 2 amperes. In the case of moving wires it must be considerably higher, at least up to 5 amperes per sq. decimeter. From this information it will be seen what quantities of current are necessary in order to coat with cadmium a certain quantity of iron wire in a working day of 8 hours, also at what desired diameter.

### Calculating Necessary Current

In order to facilitate the calculation the amount for a diameter of 1 mm. is taken. For a diameter of n mms. the surface per kg. of wire will then only be 1/n times as great, as for the same length the surface increases only with the first potential, but the weight increases with the second potential of the diameter. A wire 1 mm in diameter has therefore a weight of about 5.2 kg. per km. with a surface of 314 sq. decimeters, or per kg. 314/5.2=about 60 sq. decimeters. It will be necessary to use per kg. of 1 mm. wire $4.5 \times 60 = 270$ amp-minutes or 4.5 amp-hours, up to $7.5 \times 60 = 450$ amp-minutes or 7.5 amp-hours. If the quantity of wire to be galvanized be taken as P kgs. per hour for 1 mm. wire, P $\times$ amp-hours must be used and for P kg. of n mm. diameter wire P/n $\times$ amp-hours.

To give a practical example, suppose 600 kg. of wire are to be galvanized with cadmium per hour. Then the necessary current strength would be $4.5 \times 600 = 2{,}700$ amperes, to $7.5 \times 600 = 4{,}500$ amperes according to the coating. This strength of current is independent of the current density used, except that with a lower density the galvanizing duration or what comes to the same thing, the quantity of wire in the bath at one time, must be so much greater in proportion as to produce an ampere figure per sq. decimeter that multiplied by the duration of galvanizing in minutes results in 4.5, or 7.5 according to which coating is sought. With a current density of 1 amp. therefore, the wire must be left in the bath 4.5 (to 7.5) minutes; with 2 amps. the galvanizing duration can be reduced to half this time.

In *Draht-Welt*, Halle-Saale, Germany, Nov. 1929.

# DIGEST *of* RECENT TRADE LITERATURE

**Popular Research Narratives** is the third of these small volumes, which have proven truly popular. They are described roughly as 'fifty brief stories of research, invention or discovery, directly from the men who did it.' These pocket-sized volumes have been sponsored by the Engineering Foundation, New York. All the items are extremely interesting but those in this volume of especial interest to the wire industries are: Super-conducting Copper, Thoriated Tungsten Tubes, An Expensive Inconsistency (An Electric Cable Problem Solved by Research), Beryllium, and Aluminum Plating (A New Means for Protecting Iron). The book measures 5 x 7½, has 174 pps., and may be obtained at $1 from the foundation or the publishers, William & Wilkins Co., Baltimore.

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**Hand-to-Mouth Buying,** by Leverett S. Lyon, was chosen as the outstanding business book for Dec. 1929. It is a comprehensive analysis of American trade with particular references to the extent and ramifications of the small-scale buying that has prevailed in recent months and years. It was found that this practice is so widespread now and yet so widely different in different industries and in different sections of the country as to prevent generalizations about it. The book as a whole is divided into four main parts, entitled respectively: The Setting, The Evidence, Effects and Concomitants, and The Permanency of The New Conditions. Of the 23 chapters nearly half or 11 are devoted to Effects, making this the major part of the book. The book is 5½x7½, has 488 pps., is illustrated mostly by charts and diagrams and is priced at $4 by the publishers, The Brookings Institute, Washington.

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**Scientific Management in American Industry,** by The Taylor Society, H. S. Person, editor, might be described as a very ambitious extension of the earlier work of Taylor in exact scientific management of machine work into the whole range of business, in fact the president of the Society describes it in a preface as 'a summary of a decade's study, analysis and exposition of the philosophy, principles and procedures of scientific management.' Earlier works along this line have been more or less technical, an effort has been made in this volume to descend to a more popular level or at least to one on which the average business or corporation head would feel more at home. It is made authoritative by the calibre of the 26 contributors, practically all of whom are major executives. Following an introduction under the heading Origin and Nature of Scientific Management come 29 chapters, arranged for convenience in 6 groups. About one-third of the book is given over to the third group designated as Management Standards. Many charts, diagrams and tables of figures. The volume is large, 6½x9¼, with 480 pps., and is priced by the publishers, Harper & Bros., New York, at $6.

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**The Use of Research in Sales Management** is the title of an interesting booklet describing a study of New England industry prepared for the Research Committee of the New England Council by the Policyholders Service Bureau, Metropolitan Life Ins. Co., New York. It is the fifth in a series of reports on applying research to sales and considers this subject under these headings: Bettering Distribution, Reorganizing Sales Departments, Sales Supervision, and Improving Dealer Relations. Any manufacturer having difficulties along sales lines will be helped by reading the many practical examples cited in this booklet, which is distributed by the Metropolitan Co. without charge. In size it measures 8¼ x 10⅝, with 24 pps.

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**"Wagner Squirrel-Cage Motors".** Wagner Electric Corporation, Plymouth Ave., St. Louis, Mo. 24 pages. Illustrated. Bulletin 165 discusses the seven types of squirrel-cage motors manufactured by this firm under the headings of general purpose, normal-torque across-the-line, low-torque across the line, high-torque double-squirrel cage, punch press and elevator types.

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**"Pels Combination Shears Punches".** Henry Pels & Co., Inc., 90 West St., New York, N. Y. 8 pages. Illustrated. Circular MB-29 describes combination shears and punches suitable for cutting all forms of structural material, heavy rods or anything similar. Circular SP-29. This is of a similar nature describing billet shears, hot or cold shears and similar mill equipment manufactured by this firm, which specialized in punch and shear machinery for 30 years.

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**"Brass Facts".** Scovill Mfg. Co., Waterbury, Conn. 38 pages. Illustrated. This booklet deals with the characteristics of copper alloys, especially brass manufactured by the Scovill Company. It describes welding rod and wire, high speed brass rod, and has a form of buyers' guide in the back that mentions and describes the great diversity of products of this company which range from safety pins to plumbers brass goods and radio parts.

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**"Potentiometer Pyrometers".** Leeds & Northrup Co., Philadelphia, Pa. 44 pages. Illustrated. Catalog 87 describes heat measuring devices in considerable detail. Charts produced by the pyrometers are shown and described.

# How Modern Metals Are Evolved

## How Tungsten Carbide Has Evolved From a Soft Wire to the Hardest Metal

NOT many years ago, managanese steel was thought to be unmachinable, as were glass rods and other very hard materials, said Dr. S. L. Hoyt, recently in addressing the Engineering Foundation. About 1896, Moisson in France discovered that tungsten and carbon can be combined into tungsten carbide by the reduction of tungsten oxide, in excess, in the electric furnace. Tungsten has become known to millions of persons as the incandescent element in electric lamps.

For this purpose years of research produced soft tungsten metal, which can be drawn into fine wire. In contrast tungsten carbide is the hardest known metallic substance and ranks close to the diamond. It will scratch a sapphire, the second hardest natural mineral. Deep scratches in laboratory windows bear testimony to its extreme hardness. But tungsten carbide is too porous and weak to withstand the severe pressures to which metal-cutting tools are subjected.

More research, and then Schroeter produced 'Hartmetall. by combining cobalt with tungsten carbide. Great increase of strength and toughness was achieved without sacrifice of hardness. This alloy is very dense, being much heavier than steel. In color it resembles steel. It is chemically stable, will take and keep a cutting edge and does not lose these useful properties of elevated temperatures. Tools have been observed cutting nickel steel with their points at bright red heat, without any ill effects.

Attracted by the possibilities of a material of such remarkable characteristics, General Electric Co., undertook studies in its laboratories and shops. Improvement was effected in the alloy. Three years' experience by research men and skillful machinists in making tools and using them in a wide variety of operations has taught many lessons.

"Carboloy" has a strength more than half as great as that of the remarkable modern high-speed tool steels. Of course, it is difficult to work. It will cut a groove in an alundum grinding wheel which readily cuts other hard metals. It can be cut slowly by means of silicon carbide or boron carbide, employing methods which have been developed by experiment, in order to finish tools to the exact shapes required and give them sharp edges.

Carboloy's pound price is high, but only a small piece is used in each tool, the remainder of the tool being inexpensive steel. The two metals are joined by brazing with copper, or by atomic hydrogen welding.

Not only will carboloy machine glass, porcelain and hard metals, but it will also cut abrasive carbon, bakelite, hard rubber, mycalex (a mixture of fine mica and lead borate), genelite (a composition of copper, tin and carbon), and other relatively soft materials which wear steel tools rapidly. Carboloy tools when cutting some kinds of materials have a life of 25 to 75 times that of steel.

In testing high-speed steel tools, it is customary to use a 'test log', that is, a long, round bar of nickel-steel, making a cut in it at about fifty feet per minute. Because of the lack of effect on the carboloy cutter, however, it was necessary to increase speed to 200 ft. p. m.

At this speed a high-speed steel cutter failed in 16 seconds, with its edge burned off. The tungsten carbide tool, under identical conditions, was run for an hour before the test was arbitrarily stopped, although the tool was still cutting and capable of continuing.

Consequently, the carbide tool in many operations effects substantial savings of time and costly labor. In others it gets much better results. With it numerous operations are feasible which are not possible with any other known tool material.

View in a British wire mill, showing Barrow & Crowther wire-drawing machines.

# Sherardizing a Contact Surfacing Process

## How wire may be impregnated with zinc dust by this old process---Structure of coat---Differences from other coatings

THIS process has been in use for 20 years. The coating is produced by placing the articles in intimate contact with zinc dust in a metal container, which is then subjected to heat while the container rotates. A gradual diffusion of zinc into the surface of the iron articles takes place, the extent of this depending on the temperature attained within the drum and the period of time devoted to the treatment. Both these factors may be varied considerably; the temerature within 350 to 550 deg. C., and the time from 1 to 2 hours. At the conclusion of the process the articles, after cooling, are separated from the zinc dust and found to be covered by a dull, grey coat of zinc, which is remarkably uniform in its surface regularity. A thickness of from one to two thousandths of an inch (.001-.002) is generally aimed at.

The application of the process is necessarily limited to articles of small size, which may be conveniently packed in the drum. In comparison with the electrolytic process there is no necessity—as in the latter case—to string these small articles on wires, although the wired articles are advantageous in handling during the cleaning operations. Acid may be used for cleaning purpose, but the best results are probably obtained by sandblasting the surface. In regard to the time factor, the sherardizing process is at some disadvantage.

The structure of the coat produced is quite different from both the electro-deposit and the galvanized coat. The actual composition depends on the quality of zinc dust employed; the purer the latter, the purer the surface layers. There does not appear to be any definite break in the iron content of the various layers, this increasing progressively as the iron base is approached.

Variations of the process have been commercialized under different trade names, one process claiming the definite formation of a fairly thick zinc oxide protective layer, tenaciously held and permanently combined with the zinc surface. In another process a proportion of cadmium is added to the zinc, and the combination has been shown to be much superior, as a protective, to the zinc applied alone.

As with the galvanizing process one of the drawbacks is the temperature to which the iron and steel articles must be subjected. The appearance and color of the deposit is distinctly inferior to both the electrolytic and galvanized zinc. The thickness of the coating is, however, more readily controlled than in the latter process—although not as finely as in the electrolytic—and provided a fair tolerance is allowed, the process is eminently suitable for all kinds of small work, such as screws, bolts and nuts, wire products, washers, cams, hooks, and smaller fittings generally. For such articles the sherardizing process is the method to be chosen from an economical point of view.—Brass World.

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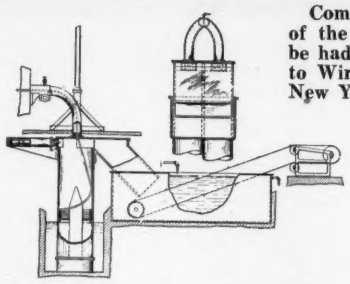
**Riley Wire Products Corp.,** Boston, has been incorporated with $50,000 capital by Francis B. Riley, G. E. Squier, H. B. Shepard, all of Newton, Mass.

**Doing the work of two men. This man with a Shepard Class H Liftabout having staff and push button control is handling 330 coils of wire rods at the Amer. Steel & Wire Co., Trenton, N. J.**

# A REVIEW *of* RECENT PATENTS



**Complete descriptions and drawings of any of the patents referred to on this page may be had for twenty five cents. Address orders to Wire & Wire Products, 551 Fifth Avenue, New York City.**

*At left—Summey Metal Coiling Apparatus, 1,739,620*
*At right—Honig Coiling Mechanism, 1,741,056*

No. 1,739,620, METAL COILING APPARATUS. Patented Dec. 17, 1929, by David Summey, Waterbury, Conn. It is an object of the invention to provide apparatus for coiling and cooling extruded stock without oxidation of the metal. This is accomplished by coiling the rods in a closed chamber, transferring the coils to a cooling tank, and setting up a non-ozidizing medium adjacent the path of travel of the stock from the press to the tank. The inventor suggests steam or carbon dioxide as the non-oxidizing medium.

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No. 1,738,812 WIRE SPLICER. Patented Dec. 10, 1929, by Hiram Allen, Williamsburg, Kan. In this wire twisting device, the assembly includes a head having a projection at one end and provided with a longitudinal passage, the head being provided with a longitudinal slot leading inwardly from the periphery of the head through the projection and to the passage, and an operating member slidable in the head, transversely thereof, to and from a position across the slot.

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No. 1,738,828 LOW RESISTANCE PERMANENT WIRE. Patented Dec. 10, 1929, by Arthur Hews Jackson, Huntington Park, Calif. In order to protect aerial wire and the like, which is exposed to the elements, the inventor coats the wire with a layer of silver and a coating of gold.

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No. 1,739,246, METHOD OF MANUFACTURING WIRE COILS. Patented Dec. 10, 1929, by Johann Majce, of Vienna, Austria. For use in electro-technical work, the inventor provides a method of manufacture of evenly spaced wire coils which consists in supporting a plurality of rods of readily fusible insulating material in spaced relation to each other, and winding a length of wire in heated condition in contact with one side of each of the rods, thereby to melt the material of the rods at the points of contact with the wire and cause the wire to embed itself in the rods.

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No. 1.739,265, WINDING APPARATUS. Patented Dec. 10. 1929, by Ladislav Statiney, Cicero, Ill., Assignor to Western Electric Co. Inc., New York, N. Y., a Corporation of New York. The invention contemplates a unitary distributing and take-up unit which is particularly adaptable to wire drawing machines of the type employed for drawing very fine wire as exemplified in the patentee's copending application. The distributing unit being provided with an element which is reciprocated by a constantly rotating cam and which is capable of being very exactly adjusted by varying its pivotal point, makes it possible to accurately lay very fine wire, such as No. 40 B. & S. wire gauge, on a take-up spool in layers of closely adjacent coils without tangling the wires or intermingling the coils of one laver with that of an adjacent layer. This is a division of the patentee's application Serial No. 566,213, filed June 6, 1922, now Patent No. 1,706,754, dated March 26, 1929.

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No. 1,739,658, WIRE STRETCHING TOOL. Patented Dec. 17, 1929, by James O. Smith, Mounds, Okla. For use in connection with the erection of wire fences, the inventor has provided a tool embodying means for gripping coaction with a fence wire to enable the wire to be properly tensioned and disposed beside the post, to which it is to be secured, and then stretched prior to anchorage to the post.

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No. 1,740,038, WIRE WORKING MACHINE. Patented Dec. 17, 1929, by Otto F. Rohwedder, Davenport, Iowa. This machine is provided to form crimped staples, hairpins or the like from a length of wire, without any considerable amount of stretching of the wire. The assembly includes a stationary crimping plate mounted thereon and having opposite indented edges, a series of crimping levers pivotally mounted on the support and having their lower ends corresponding to and slightly smaller than the indentations of the plate, the levers being spaced the same as the indentations of the plate, a longitudinally movable plate straddling the crimping plate, and having pins mounted thereon adjacent the head of the crimping plate, the pins being spaced apart approximately the width of the crimping plate and adapted to bend and hold the material to be crimped in close contact with the indented edges of the crimping plate.

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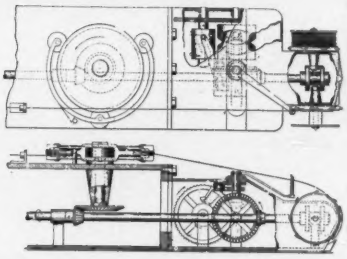
No. 1,740.076, ELECTRIC CABLE. Patented Dec. 17, 1929, by Jules Delon, Lyon, France, Assignor of One-half to Compagnie Generale d'Electricite, Paris, France. The employment of perforated metallic sheets. The method which forms the subject of the present invention consists in rendering conductive the surface of the central packing as well as that of the three angular packings, and in connecting these conductive surfaces inter se and with the lead sheath. The material forming the packing is either enveloped by a strip of metal or of metallic tissue or by a strip of metallized paper or of metallized tissue or the packings are formed of packets of metallic non-magnetic threads or of threads of jute or of other material rendered conductive by metallization or in any other manner.



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No. 1,741,056, MECHANISM FOR AND METHOD OF COILING WIRE OR THE LIKE. Patented Dec. 24, 1929, by Frank Honig, Oak Park, Ill., Assignor to Cyclo Corp., Chicago, Ill., a Corporation of Illinois. In this invention, the patentee, employs a self-discharging drawing capstan or drum, which has a stationary axis. That is, in this case, the self-discharging capstan is non-travelling, in the sense that it is not bodily movable. It is non-planetary, that is it does not travel in an orbit, as distinguished from constructions shown in other pending applications of the patentee (Serial No. 442,024, filed February 3, 1921, No. 611,061, and No. 611,062, filed January 6, 1923, No. 626.833 and No. 626,834) filed March 22, 1923. The wire, or other flexible member, is discharged from the self-discharging capstan and is suitably coiled; or it may pass to suitable take-up mechanism and be deposited on spools.

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No. 1,741.623. WIRE BAG MAKING MACHINE. Patented Dec. 31, 1929, by Yves Guyon and Rene Henri Charles Marty, Paris, France. This is described as a simplified form of a machine described in U. S. Letters Patent No. 1,581,965, adapted to make a bay of wire fabric comprised of double netting or multiple twist. The present invention relates to the free ends of the wires comprising the wire fabric, are terminated with small balls of metal obtained by fusion by means of a blowpipe, electrical soldering, immersion in a suitable bath or any other equivalent means, so as not to present any dangerous or inconvenient wire points.

Sleeper & Hartley
TRADE MARK
REG. U.S. PAT. OFF. & PRINCIPAL FOREIGN COUNTRIES

# Practical Wire W

These Machines Go Into Production at O

## Continuous Rod Frame

(No. 5—14 or 15 wire)

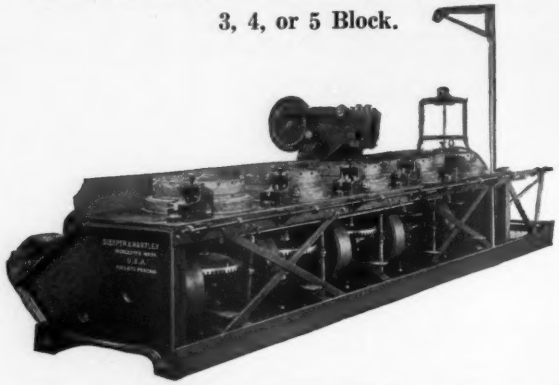
Patented June 3, 1924—May 12, 1925—others pending

All Ball or Roller Bearings

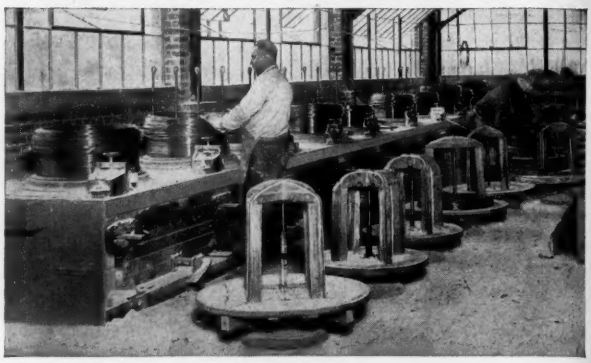
No Differential Gearing.

Automatic Compensation for Speeds of Heads.

3, 4, or 5 Block.



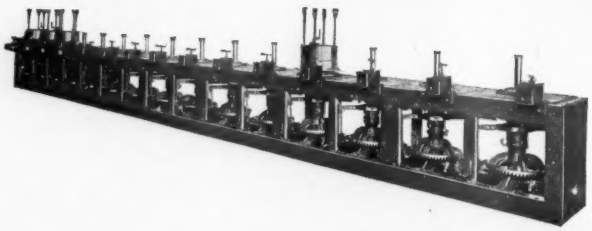
## Single Hole Drawing



### Standard Rod Frame—10 Block

Long, Stiff Spindles, in anti-friction bearings, and equipped with friction Clutches. Powerful and reliable. Practically noiseless in operation.

(New Plant of Thompson Wire Co., Worcester, Mass.)



### Heavy 16" Frame For .65 Carbon Wire No. 10½ to .037"

15 Blocks: Motor driven. Silent chain. Anti friction bearings and cut gears throughout.

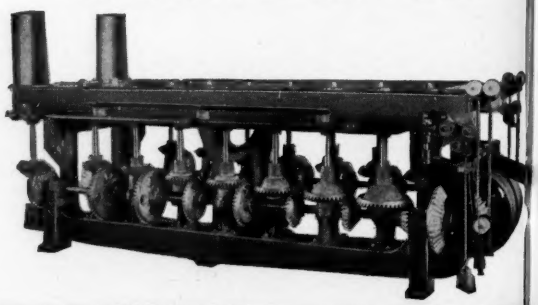
(New Plant of Johnson Steel & Wire Co., Worcester, Mass.)

## Double 8-Draft Fine Wire: W

No. 22 to 36. High or low carbon wire.

6 Blocks to Average Operator, 22-33, 8-hole, 660 lbs. of ten hours.

Many thousands of these heads in operation



CHICAGO TERRITORY
Neff, Kohlbusch & Bissell, Inc.

San Francisco:
L. G. Henes Machine Tool Division of Jenison Machinery Co.

Los Angeles:
L. G. Henes Machinery Co.

FOREIGN AGENTS AND REPRESENTATIVES: UNITED KINGDOM—Mr. Fredk. A. Perry, 63 Queen Victoria St., London, E. C. 4
AUSTRALIA AND NEW ZEALAND—Edwin Wood Pty. Ltd., Melbourne
MONTREAL AND TORONTO—Arthur Jackson Machine Tool Co.
JAPAN—Andrews & George Co., Tokyo

SLEEPER &

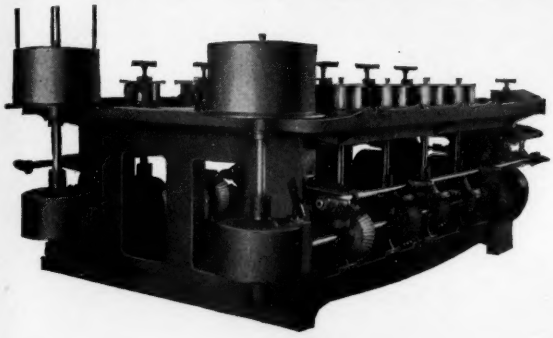
# Working Machinery

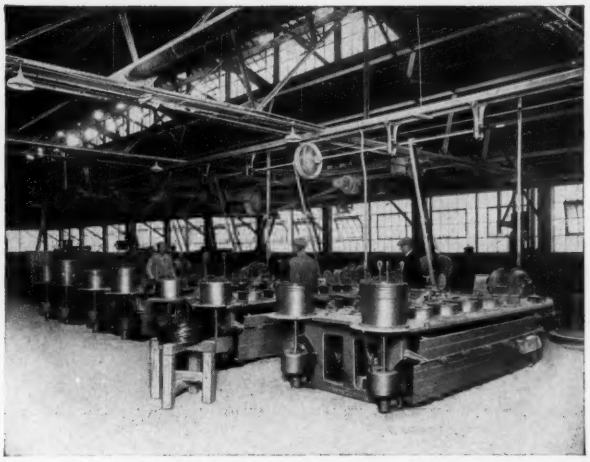
Sleeper & Hartley TRADEMARK

at Once—Reducing Overhead—Increasing Production!!

## Double 5-Draft Dry, Intermediate

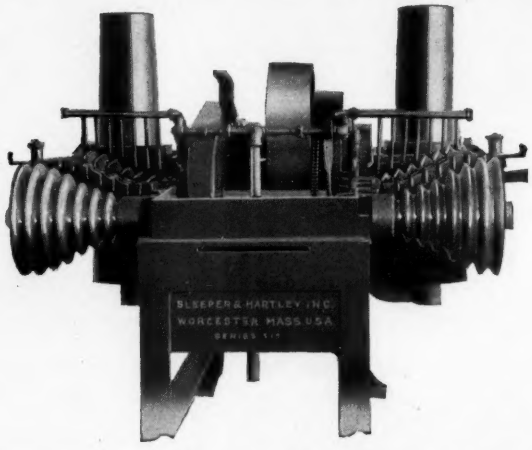
**No. 14 to No. 23. High or low carbon wire.**
**3 to 4 Blocks to Average Operator.**
**No. 14 to 19—4 hole, 1400 lbs. per block.**
**No. 14 to 20—5 hole, 1100 lbs. per block.**
**More than 300 heads of this improved model in operation**





**Battery of Double Six-Draft Dry Continuous For High Carbon Wire**

**Direct driven with silent chain. Cut gears throughout. Anti-friction bearings. Variable speed for finishing block. (New Plant of Thompson Wire Co., Worcester, Mass.)**




**Improved Double 8-Draft Cone Type Continuous Wet Wire Drawing Machine**

**Patenting Furnace Take-Up**

**(New Plant of Thompson Wire Co., Worcester, Mass.)**

**NEW YORK TERRITORY—Triplex Machine Tool Co.**

**Philadelphia Territory**
**Swind Machinery Co.**

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# NEWS *of the* INDUSTRY

**Foreign Trade Opportunities** reported by the U. S. Bureau of Foreign and Domestic Commerce during the month of January include inquiries from the following sources: Insulated electric wires and cables (42792) Casablanca, Morocco; best grade welding wire (42850) Cardiff, Wales; electric wiring supplies (43004) Pernambuco, Brazil; barbed wire and wire nails (42976) Pernambuco, Brazil; tinned and barbed wire (43024) Cairo, Egypt; bolts, nuts and screws (43142) Zutphen, Netherlands; wood and brass screws (43074) Lahore, India, agency wanted; wood and brass screws (43149) Glasgow, Scotland, purchase; iron wire for electric welding (43147) Palermo, Italy; steel wire for screen manufacture (43139) and wire weaving looms for producing (43039) Vancouver, Canada; bolts, screws, rivets and expanded metals (42407) Montevideo, Uruguay, barbed and plain wire (42487) Bogota, Columbia; wire netting for meat safes, etc., (42407) Montevideo, Uruguay; barbed wire and wire for bed springs (43371) Santo Domingo, Dominican Rep.

**Amer. Steel & Wire Expanding**

Amer. Steel & Wire Co., subsidiary of U. S. Steel Corp., has completed plans for the expenditure of $10,000,000 in improvements and expansion at the Newburgh works in Cleveland, as well as equally large betterments at other plants throughout the country. At Newburgh, new bar mills will be constructed covering a wide range of sizes with a capacity of 200,000 tons a year, and special steels will be made. An open-hearth plant will be added to what has previously been largely if not wholly Bessemer steel.

**Scovill Purchases Schrader's Sons**

The Scovill Mfg. Co., Hartford and Waterbury, Conn., has arranged to acquire the entire stock of A. Schrader's Sons, Inc., Brooklyn, N. Y., widely known in the automotive field as manufacturers of tire gauges, valves and tools. It employs 2,000 men and has been a customer of Scovill for 35 years. The purchase will be financed through an issue of $25,000,000 5½% debentures. Scovill is widely known in the wire industry, controlling the Amer. Pin Co., and the Oakville Co., makers of pins. It controls also the Hamilton Beach Co., Racine, Wis., maker of vacuum cleaners and other household electrical apparatus, and the Gilchrist Co., Newark, N. J.

**Carnegie to Offer Doctor's Degree in Metallurgy**

GRADUATE courses leading to the doctor's degree in metallurgy will be offered by the Department of Mining and Metallurgy at the Carnegie Institute of Technology beginning next fall, President Thomas S. Baker has announced. The announcement marks a new departure in policy as the graduate work now being given leads only to the master's degree.

The plan to give advanced graduate work is the natural outgrowth of the program of research in steel and coal projected by the institution. The new course had its origin in the belief that there is an acute need for a more comprehensive study of the science of metals; that theoretical knowledge has lagged far behind demands of industry. Pittsburgh, the center of the steel industry, is a logical place for such work since the mills furnish adequate fields for practical study. The present research laboratories will be at the disposal of the students under the supervision of a competent teaching staff. Particular emphasis will be placed on the study of special steels about which knowledge is lacking.

The proposed advanced study program will include: Advanced Metallurgy of Iron and Steel, Corrosion of Metals, Advanced X-Ray Analysis, Advanced Electrochemistry and Electrometallurgy, Economic Metallurgy, Plant Problems, Refractories, Physical Chemistry of Iron and Steel Making, Metallurgical Design, and Advanced Testing of Materials. The work will be given by the Department of Mining and Metallurgy of which Professor James Aston is head, assisted by the Bureau of Metallurgy Research which Dr. Francis M. Walters, Jr., directs.

## Personal Mention

**Amos G. Bussmann,** formerly welding engineer for the American Steel & Wire Co., New York, has resigned to become president of the Standard Steel & Wire Co., Greensburg and Bolivar, Pa. The Standard company manufacture welding wires and furnish the trade a grade of wire for each particular welding problem.

**Donald MacGregor,** a veteran newspaperman, has been placed in charge of the new Southern office of the Copper & Brass Research Ass'n, in the Shoreham Bldg., Washington, D. C.

**Harry O'Connor,** superintendent of the Anderson, Ind., mill of the American Steel & Wire Co., retired from active duty Jan. 1. He became affiliated with the steel industry 44 years ago at Salem, O. He has been employed in different capacities with the steel industry at Beaver Falls, Pittsburgh, Cleveland and DeKalb, Ill. He was located at DeKalb for 17 years, as superintendent of the Steel Corporation's plant. He was transferred to Anderson as superintendent in 1916. Mr. O'Con-

nor plans a rest at his country home, 5 miles west of Anderson, Ind. E. C. Morrison, who has been assistant superintendent at the Anderson works for the past 15 years, has been promoted to superintendent.

---

**Owen K. Parmiter,** metallurgical engineer, Firth-Sterling Steel Co., McKeesport, Pa., spoke on stainless steel at a meeting of the Worcester chapter of the American Society for Steel Treating on Jan. 9.

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**John B. Thomas,** heretofore of the Keystone Steel & Wire Co., Peoria, Ill., has succeeded William H. Childs as general sales manager of the Mid-States Steel & Wire Co., Crawfordsville, Ind. Mr. Thomas was recently made a director of the Mid-States company. The retiring sales director has accepted a similar position with the Continental Steel Co., Kokomo, Ind.

---

**Edwin P. Corey,** assistant general manager of sales, in charge of pipe and wire products, Youngstown Sheet & Tube Co., has been promoted to general manager of sales. The position is newly created, the duties having been handled by Walter E. Watson, vice-president, who continues in that capacity. L. E. Wallace will succeed Mr. Corey.

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**Henry Meister,** assistant superintendent of the Mid-States Steel & Wire Co., Crawfordsville, Ind., retired the first of the year, after 50 years in the steel industry.

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**Walter C. Allen,** president, Yale & Towne Mfg. Co., Stamford, Conn., has been made a director of the Western Electric Co., Inc.

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**James F. Croft,** formerly metallurgist for Mackintosh-Hemphill Co., Pittsburgh, has become metallurgist, in charge of the roll department, of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

### COMING EVENTS

February 7. Youngstown District, Amer. Iron and Steel Electrical Engineers, at Youngstown, Ohio.

February 7. Ontario Chapter of the American Society for Steel Treating, Toronto, Ontario.

February 7-8. Semi-annual meeting, Amer. Society for Steel Treating, at Hotel Pennsylvania, New York, N. Y. Robert G. Guthrie, presient, 7016 Euclid Ave., Cleveland, O.

February 11. Columbus Chapter, Amer. Society for Steel Treating, at Columbus, O. Paper on Fuels & Furnaces by C. F. Cone.

February 14-15 — Semi-annual meeting of the American Society for Steel Treating at New York, N. Y.

February 18-20. Aeronautic meeting, Society of Automotive Engineers, at St. Louis, Mo. Coker F. Clarkson, secretary, 29 West 39th St., New York.

February 21. Washington-Baltimore Chapter, Amer. Society for Steel Treating, at Washington, D. C. to coincide with N. A. C. A. meeting.

March 3-5. Nat'l Management Congress, sponsored by Amer. Society of Mechanical Engineers, at Hotel Stevens, Chicago, Ill. Calvin W. Rice, secretary, 29 West 39th St., New York.

March 5-7. National Materials Handling meeting, sponsored by Amer. Society of Mechanical Engineers, at Hotel Stevens, Chicago, Ill. Calvin W. Rice, secretary, 29 West 39th St., New York.

March 6. Tri-Chapter meeting of Columbus, Dayton and Cincinnati, Amer. Society for Steel Treating, at Cincinnati. Paper on Carboloy by S. L. Hoyt. N. C. Strohmenger, secretary, Tool Steel Gear & Pinion Co., Cincinnati.

April 5-9. Fiftieth Anniversary Celebration, Amer. Society of Mechanical Engineers, in New York and Washington. Calvin W. Rice, secretary, 29 West 39th St., New York.

May 29-31—57th Annual Meeting of the American Electrochemical Society at St. Louis, Mo.

June 16-20. Exposition sponsored by Assn. of Iron & Steel Elec. Engineers at Broadway Auditorium, Buffalo, N. Y. John F. Kelly, man. director, 1010 Empire Bldg., Pittsburgh, Pa.

## Obituary Notice

**Herbert Du Puy,** former president and chairman of the board of Crucible Steel Co., of America, died at his home in Pittsburgh, Jan. 10th. He was 73. Mr. Du Puy had spent a lifetime in the steel business, associating early in his career with Andrew Carnegie. He discovered, and was the first to make practical use of, roll scale, the oxide and iron formerly wasted, but which he found contained 70% pure iron, richer than most ores. He was a partner in the Anderson & Du Puy Co., which took over the Siemens-Anderson Steel Co., that had made the steel cables for the Brooklyn Bridge.

---

**The Parker Rust Proof Co.,** has declared an extra dividend of $1 a share and a regular quarterly of 50 cents a share on common.

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**Providence Insulated Wire Co.,** 65 Wadsworth St., Providence, R. I., has awarded the general contract for a two-story addition, 40x72 ft., to cost $25,000 with equipment.

---

**American Steel & Wire Co.,** 208 South La Salle St., Chicago, has plans for immediate erection of one-story unit, 80x800 ft., at Waukegan plant, primarily for wire drawing, increasing that division by about 25 per cent, estimated to cost $800,000 with equipment.

---

**Atlantic Wire Co.,** Church St., Branford, Conn., has begun construction of one-story addition, 60x60 ft. Leo F. Caproni, 1056 Chapel St., New Haven, Conn., is engineer, in charge.

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**Kerite Insulated Wire & Cable Co.,** Seymour, Conn., has awarded general contract to H. Wales Lines Co., Meriden, Conn., for one-story and basement addition 30x45 ft., to cost about $25,000 with equipment. Headquarters are at 30 Church St., New York.

---

The Globe Diamond Die Corp., with offices at 27 State St., New York, has appointed R. Kohl sales director. Mr. Kohl's long experience in this field qualifies him in his new endeavors. The plant at Cranford, N. J. is equipped with new modern machinery and every facility for serving the industry.

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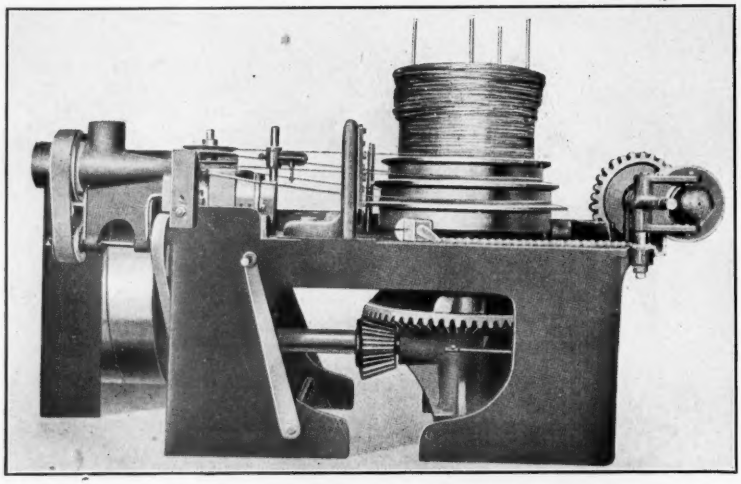
# Barco Three-Hole Ripper



Side View of the Barco Three-hole Ripper With Internal Differential

THE machine illustrated is manufactured by Barron & Crowther, Southgate Mill, Preston, England, well known makers of various patented continuous wire-drawing machinery, including the new differential three-hole machine. The Ripper, designed for use with iron, steel, copper or nickel rods, has power pull-in, automatic stop motion, automatic soap box, internal differential and spindle mounted on ball bearings.

The differential type of machine accommodates itself automatically for the elongation of the wire being drawn. However the machine is drafted, be the pinches light or heavy. The drawing blocks automatically adjust their speeds to take up the lengthening wire. Although all blocks revolve on the main spindle they rotate independently of it. Spindle speed is fixed, in the No. 1 machine it is 41 r. p. m. but the finishing drum speed may be anything desired from 55 to 90 r.p.m., according to the drafting of the machine and the consequent elongation of the wire. The first drawing drum always runs slower than the main spindle.

For this type of machine, rapid production with unskilled labor is claimed, also the substitution of automatic operation for personal skill, lowest production cost, and large output in small floor space.

# New Belke Salt Spray Tester

USE of the salt spray test to test the wearing qualities of coatings is increasing as to scope, dependence placed on results obtained and wider or more general use of such tests. The Belke Mfg. Co., Chicago, which makes a number of salt spray testers and has studied such testing equipment thoroughly for several years, has recently put out a new and larger machine as shown herewith. This is suitable for galvanized or other coated wires, as well as for the sheet metal product shown in it, it is said to be built along entirely new lines. This unit is a square tank of white enameled steel, with Monel trimmings and glass top, mounted on legs. It is equipped with a sloping drain and glass rack for articles to be tested. It is

General View of the New and Larger Belke Salt Spray Testing Machine.

gas tight and adapted to testing plating of various kinds. This new machine is said to be based on the same general principles which have characterized the other unit.

The Bureau of Standards, commenting on the Salt Spray test have found: "Although the salt spray test is subject to objections, it may be regarded as the best test for zinc coatings. A sample showing rust spots in 24 hours should be set aside as unsatisfactory, while a sample that would withstand two or three days could be relied on as to the plating. Any test which will effectively show the presence, number and approximate size of breaks or pinholes in a comparatively short time (usually 3 to 10 hours) may be used to include in a general way the quality of the coat applied.

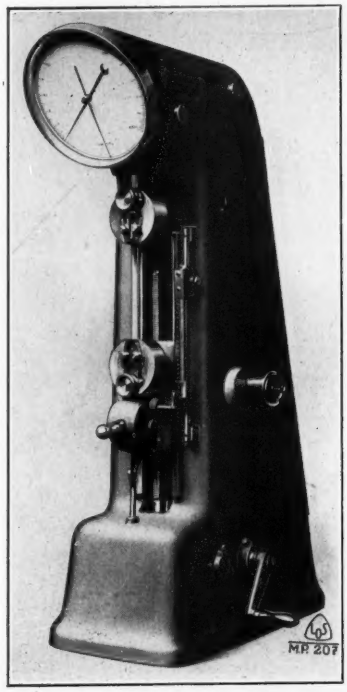
Aside from what is claimed to be the highly efficient design of this Belke product for testing purposes, its appearance is attractive, giving the whole equipment a clean, white effect.

## Small Wire Tension Tester with pendulum

THIS machine, with a capacity up to 10,000 lbs. has a double graduation, which allows the measuring of even very small loads.

By adding or removing an additional weight on the pendulum the machine, without other change, can be used for either small tests or heavier work. The

(*Please turn to page 60*)

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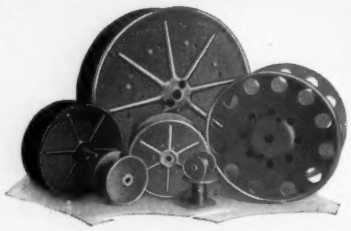

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Apco Mossberg reels and spools are scientifically designed to give very long service. Their extreme lightness reduces the cost of handling and shipping.
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Industrial Cleaning Materials and Methods

## Drawing Rhodium Wire

(*Continued from page 42*)

1.986° and 1,987° C., respectively. Values for freezing points from experiments were 2,006° and 2,002° C., respectively.

Another series of observations was made on a third ingot, using a precision optical pyrometer to make the temperature measurements. An arrangement of furnace, evacuated tube, and cruicble similar to that described above was used, except that a "black body" was obtained somewhat differently. Instead of drilling a hole in the ingot and sighting on the bottom of that, a cover (of thorium oxide) was cemented on the crucible. To the bottom of this cover was fixed a thin-walled thorium oxide tube, about 2 mm. inside diameter, and closed at the lower end. The tube projected down through the center of the ingot to the bottom of the crucible. Temperature readings were made by sighting through a hole in the cover into the reentrant tube into which enough loose thorium oxide that had been poured to fill it about one-third of the way from the bottom. This gave a "black body" into which to sight which was about two-thirds of the distance from the top of the ingot to the bottom. It is considered that the temperature measured inside the tube is that of the metal. The metal can thus be melted and frozen a number of times without disturbing the crucible or contents, as long as the sight tube remains intact. On plotting the time-temperature curves for determinations made with this type of crucible there was a flat region on each curve extending over a period of about five minutes. Observations were made on three melts and five freezes as follows:

| Melting °C. | Freezing °C |
|---|---|
| 1.985 | 1,984 |
| 1,984 | 1,985 |
| 1,984 | 1,983 |
| ..... | 1.986 |
| ..... | 1,983 |
| Average ....1,984 | 1,984 |

These values show the precision to which the brightness at the melting and freezing points of rhodium can be determined, but does not necessarily mean that the conversion of these measures of brightness to degrees centigrade was as accurate as the agreement between the separate determinations. Up to the present time accurate checking of the factors entering into this conversion has not been made. The temperatures given above are certainly accurate within ± 10°. From results of two methods described, the melting point of rhodium is given tentatively as 1,985° C. ± 10°

### Density

Previous determinations of the density of rhodium range from 1.10 given by Wollaston in 1804, to 12.6 (g/cm³).

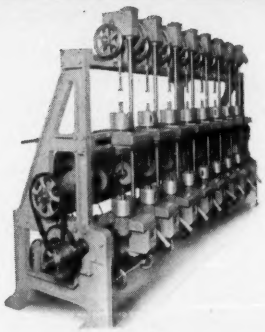
In the present work the density of three rhodium ingots after melting in vacuum was 12.42, 12.41, and 12.41 g/cm³, respectively. The three ingots were then melted together on a block of lime with an oxyhydrogen flame. The button was hot forged and then hot swaged to a rod 7 inches long by 0.265 inch n diameter. The density of this rod was 12.40 g/cm³. The rod was subsequently swaged to 0.040-inch wire. The density of the wire was also 12.40 g/cm³.

### Electrical Resisitivity and Thermal Electromotive Force

The resistivity of pure rhodium as determined on wire hot swaged to a diameter of 1 mm. and annealed at a temperature well over 1,200 deg. C. was 4.93 microhm-centimeters at 20° C.

The value given in the International Critical Tables is 5.1 at 20 deg. C. In Carter's [15] tabulation of the physical properties of rhodium the resistivity at 0 deg. C. is given as 5.11.

The thermal electromotive force of rhodium against the bureau's purest platinum (Pt. standard No. 27) was determined for temperatures of the hot junction from 0 deg. C. to 1,100 deg. Co. with the cold junction at 0 deg. C., The results are given in Table 1.

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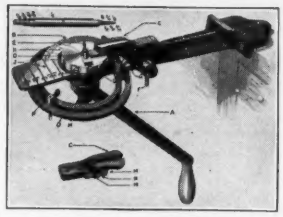

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### Temperature Coefficient of Electrical Resistance

When this determination was made wire less than 1 mm. in diameter was not available. The resistance of this wire was too low to make a measurement of the change of resistance with change of temperature with reasonable accuracy. To provide a suitable specimen, about 1 m. of the wire was clamped between electrical leads and a current passed through the wire to heat it to dull redness. The hot wire was passed back and forth between the rolls of a small hand rolling mill until a ribbon 0.007 in. thick was obtained. This ribbon was fairly ductile. The resistance was measured at 0° and at 100 deg. C. The average temperature coefficient of resistance between these temperatures was 0.00436. Holborn reported a value of 0.00443.

TABLE 1.—*Thermal electromotive force of rhodium against platinum*

| Temperature | Emf. | Temperature | Emf. | Temperature | Emf. |
|---|---|---|---|---|---|
| ° C. | mv | ° C. | mv | ° C. | mv |
| 0 | 0.00 | 500 | 5.28 | 900 | 12.04 |
| 100 | .70 | 600 | 6.77 | 1,000 | 14.05 |
| 200 | 1.61 | 700 | 8.40 | 1,100 | 16.18 |
| 300 | 2.68 | 800 | 10.16 | 1,200 | a 18.42 |
| 400 | 3.92 | | | | |

a Extrapolated.

### Thermal Expansion

The linear coefficient of thermal expansion of rhodium was determined by the interferometric method. The values in Table 2 are accurate within 1%.

The International Critical Tables give the coefficient of thermal expansion as $8.4\times10^{-6}$ at 20 deg. C. Carter, in his tabulation of the physical properties of the platinum metals, gives $8.4\times10^{-6}$ at 20 deg. C. and $8.5\times10^{-6}$ at 40 deg. C.

TABLE 2. *Thermal expansion of rhodium*

| Temperature range | Average coefficient of expansion per degree centigrade |
|---|---|
| °C. | $\times10^{-6}$ |
| 20 to 50 | 8.1 |
| 20 to 100 | 8.3 |
| 20 to 200 | 8.5 |
| 20 to 300 | 8.9 |
| 20 to 500 | 9.3 |
| | 9.6 |

### Hardness

Hardness determinations were made on several specimens of the melted and forged rhodium. The shape of the specimens as melted made it impracticable to make hardness determinations without forgin, although a Brinell number was obtained on the ingot as melted. The hot-forged specimens were annealed above 1,200 deg. C. with results in Table 3.

Carter has given the baby Brinell hardness of cast rhodium as 139.

The hardness values obtained in the present work correspond quite closely with those of hard-rolled copper. Despite this apparent softness, rhodium does not machine readily. Great difficulty was experienced in drilling the sight holes in the specimens used for melting-point determinations. An ordinary twist drill made hardly any impression.

TABLE 3.—*Hardness of rhodium*

| | Specimen A melted, but not forged | Specimen B melted and forged | Specimen C melted and forged |
|---|---|---|---|
| Baby Brinell 12.8 kg. 1-16-inch ball | 101 | 101 | ..... |
| Rockwell "E" 100 kg. ⅛-inch ball | ..... | 90 | 85 |
| Scleroscope | ..... | 12 | 10 |
| Vickers hardness tester, 136° diamond pyramid 10 kg. | ..... | 121 | 15 |
| Herbert pendulum (time hardness) | ..... | 16.4 | 125 |

## Domestic Exports and Imports of Wire and Wire Products

**Exports of iron and steel wire and wire products from the United States in October and November, 1929**
(In gross tons)

| Item | November 1929 | October 1929 | November 1928 | January through November 1929 | January through November 1928 |
|---|---|---|---|---|---|
| Wire rods | 2,518 | 2,578 | 3,261 | 39,194 | 35,787 |
| Plain wire | 2,814 | 3,471 | 4,357 | 42,354 | 43,596 |
| Barbed wire and woven wire fencing | 3,461 | 5,673 | 7,476 | 60,066 | 68,964 |
| Wire cloth and screening | 123 | 115 | 173 | 1,579 | 1,681 |
| Wire rope | 316 | 597 | 461 | 6,584 | 4,757 |
| Insulated wire and cable | 159 | 51 | 104 | 1,012 | 595 |
| Other wire and manufactures of | 517 | 619 | 930 | 9,072 | 9,112 |
| Wire nails | 604 | 721 | 844 | 12,681 | 13,540 |
| Nails other than wire | 903 | 525 | 762 | 8,995 | 8,345 |
| Tacks | 42 | 52 | 56 | 619 | 668 |
| Bolts, nuts, rivets, except track | 1,058 | 1,267 | 1,588 | 14,756 | 12,421 |

### Imports

**Imports of iron and steel wire and wire products into the United States**
(In gross tons)

| Item | November 1929 | October 1929 | November 1928 | January through November 1929 | January through November 1928 |
|---|---|---|---|---|---|
| Wire rods | 1,364 | 642 | 1,892 | 14,614 | 14,970 |
| Barbed wire | 519 | 450 | 1,111 | 5,455 | 4,804 |
| Round iron and steel wire | 320 | 400 | 423 | 5,349 | 4,259 |
| Tteel telegraph and telephone wire | 7 | 5 | .... | 26 | 173 |
| Flat wire and strip steel | 171 | 187 | 305 | 2,021 | 2,307 |
| Wire rope and strand | 169 | 379 | 147 | 2,327 | 1,519 |
| Other wire | 30 | 3 | 183 | 435 | 684 |
| Nails, tacks and staples | 591 | 609 | 1,126 | 8,390 | 9,337 |
| Bolts, nuts, rivets and washers | 47 | 34 | 5 | 355 | 227 |

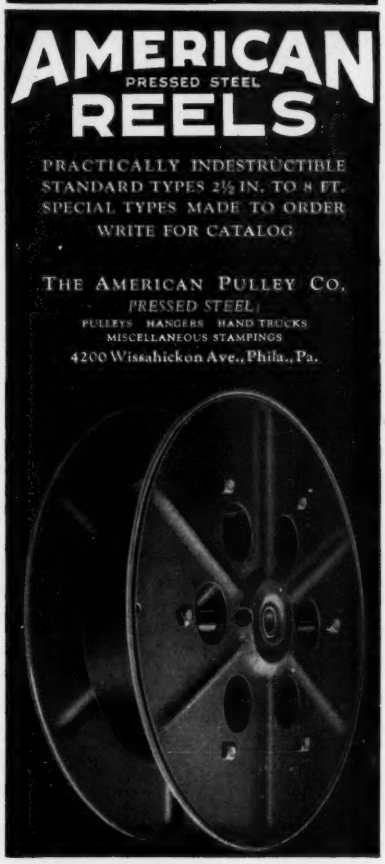
IN the Dept. of Commerce summary of the wire exports for October 1929, Canada appears as our best customer for plain iron and steel wire, taking 847,493 pounds with Argentina second, 530,275 pounds. In galvanized wire, the positions are reversed, Argentina taking 1,577,886 pounds and Canada 522,375. Argentina led but Mexico was second in barbed wire, 4,092,565 and 1,480,353 pounds, respectively. In wire rope, Canada was back as leader with Venezuela second, the figures being 301,635 and 199,624 pounds. Cuba led in importation of insulated wire and cable with 31,939 pounds while Canada was second with 24,409. The Philippines took the greatest quantity ures being 301,635 and 199,624 pounds, Cuba following with 298,336. Cuba was the leader in woven wire fencing with the Philippines, while Mexico and Canada were the two best customers for woven wire screen cloth. In other wire forms, Canada again led and Mexico was second, while Columbia took the most horse shoe nails with Japan second.

In the whole eleven classifications, Canada was the leader 4 times, second 3 times, fourth 1, and fifth 1, while Cuba was leader 2, second 2, third 1, fifth 3 and sixth 2.

Imports of card clothing in November dropped to 19,093 square feet, valued at $32,085, of which 16,824 square feet ($26,386) came from the United Kingdom. Smaller quantities were also received from France and Germany. Receipts of wire cloth and screening suffered a further drop and totaled only 47,627 square feet—23,721 square feet coming from Germany, 19,695 feet from Canada, and 4,203 feet from France.

France was the principal factor in the trade in wire heddles, 1,325,000 pieces of the total of 3,998,000 pieces coming from that source. Other important suppliers were Germany, 1,043,000 pieces; Switzerland, 1,010,000 pieces; and Czechoslovakia, 620,000 pieces. Wood screw imports totaled 12,364 gross, valued at $2,439 in November—11,512 gross ($2,330) coming from Sweden and 852 gross ($109) from Switzerland.

KESTER FLUX-CORE SOLDER
FLUX IN POCKETS
SOLDER WALL
Ready to Use
Needs only Heat
KESTER SOLDER
Flux-Core
Economy
Kester for economy. Saves the time and labor of searching for, handling, and applying a separate flux. For every phase of industrial soldering, use Kester, the solder with the flux right in the core.
The Kester engineers will gladly meet your particular soldering requirements with a special solder from our enormous line including 48,000 cored wire items. Write for particulars.
KESTER SOLDER CO.
4248 Wrightwood Av., Chicago, Ill.
Established 1899, Formerly Chicago Solder Co.
KESTER
FLUX-CORE
SOLDER
ACID-CORE
ROSIN-CORE
PASTE-CORE
METAL MENDER
RADIO SOLDER



# "BALLOFFET"

Accurate

Dependable

*"The quality die"*

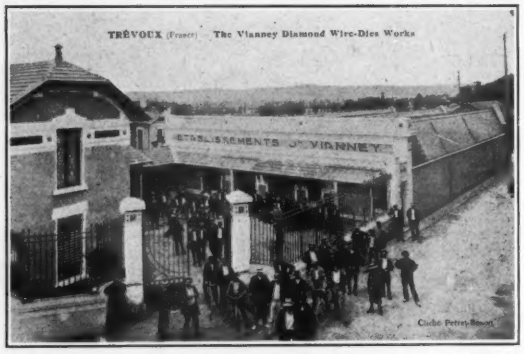
*Our experts will solve your die problems*

**Balloffet Diamond Wire Dies Co., Inc.**
**13-15 E. 22nd St. NEW YORK**

Lagnieu (France) Trevoux (France)

# VIANNEY

## Famous Wire Drawing Diamond Dies




MAIN PLANT: TREVOUX, FRANCE

Other French Plants Located at Vezeronce & Le Creusot

**NEW YORK Office and Plant, 100 FIFTH AVENUE**


### Tension Tester with Pendulum

(*Continued from page 55*)

double range, for instance, can be divided from 0 to 10,000 lbs. and 0 to 2,000 lbs., the lower range thus having a dial reading of 5 lbs.

The dial, which is at oblique eye height, can be arranged for any load desired, as from 0 to 3,000 lbs. and 0 to 750, thus giving a reading to 1 lb.

The shaft of the pendulum arm runs in ball bearings and reduction levers on steel knives.

The pendulum balance has an integral, frictionless oil-brake for damping the back-lash.

The machine is equipped with special patented grip heads for rapid and easy handling. The lower grip can be disengaged from the spindle and raised or lowered in order to quickly adjust it to the required height of the specimen.

An elongation indicator on the right hand side of the machine is connected to the lower grip and stops automatically when the break occurs.

There is also a mechanical stop for the travelling grip head, when moved in power reverse back to its starting position. When the operator has to make, say 50 or 100 10-in. tests on wire as soon as he has made one test, he can move the head back to its original position.

The machine can be equipped for hand drive and motor drive with a friction gear for the regulation of the working speed from 1 to 12 in. p. m., with tachometer to measure the testing speed and autographic recorder, for making charts.

All parts are covered against dust and the easy handling of the machine makes it indispensable in all wire plants and laboratories, where quick and accurate tests are to be made. This and other testing machinery made in Dusseldorf, Germany, by the Losenhausen Werke, are handled in the United States by Alfred Suter, Engineer, 200 Fifth Ave., New York.

**Torrington Co.**, Torrington, Conn., manufacturer of wire and metal specialities, swaging machinery, bicycle parts, etc., has organized a subsidiary to operate in Great Britain, under the name of Torrington Company, Ltd. It is capitalized at $25,000 and is said to be seeking a plant.

---

**The Byars Mfg. Co.**, Charlotte, N. C., has been incorporated with an authorized capital of $100,000. to manufacture window screens and other wire products by George W. Byars, L. C. Ripple, Clarence Henkle of Welcome, J. J. Hedrick, P. V. Critcher, and J. R. Meyers of Thomasville, N. C.

**Lydon Brothers, Inc.**, recently organized, is manufacturing industrial ovens for japanning, enameling, tempering, annealing and glass decorating, at its plant, 229 Colden St., Jersey City. T. Lydon, formerly district sales manager of Young Bros., Detroit, heads the company.

---

**E. W. Carpenter Mfg. Co.**, Railroad Ave., Bridgeport, Conn., manufacturer of wire goods, sheet metal stampings, dies, etc., has awarded general contract to Hewlett Co., 886 Main St., for a one-story addition, 60 x 200 ft., to cost over $50,000 with equipment. Fletcher-Thompson, Inc., 542 Fairfield Ave., is architect and engineer.

---

**There are 20 miles of wire** in the Dodge Brothers electric sign, five stories high and extending for half a city block, on the roof of the Strand Theatre, Broadway, New York City.

---

**The Winsted Insulated Wire Co.**, now doing an annual business approximating $1,000,000 with a force of 50 men, is planning to add many men to operate 20 more machines which were installed Jan. 1, 1930. The great quantity of wire produced is delivered by a motor truck to a radio manufacturer in Easton, Pa. James Sweet has recently secured control.


GLOBE DIAMOND DIES

**for Wire Drawing**

**Long wear--Smooth-Drawing--Accuracy**

Our specialty is a patented process of mounting the Dies in a **reinforced Steel-Setting.** Proven a big advantage. This mounting in conjunction with **highest quality globe-shaped Diamonds** results in an unsurpassed product.

***Our representative will gladly call on request.***

**Globe Wire Die Corp.**

24 State St. New York, N. Y.

TELEPHONE: BOWLING GREEN 6190

Branches: Detroit, Chicago, Cleveland, Buffalo

European Offices: Antwerp, Amsterdam, London, Paris

Bellis Lavite

**the ideal heating medium**

**Modern Annealing Costs Less**

LAVITE, the modern annealing process, produces better structures and better working metal. Used with the new Lavite electric furnace it gives a combination that is without equal in performance, economy and uniformity of product. Tell us what your annealing job is and we will suggest the best equipment for your work.

**THE BELLIS HEAT TREATING CO.**

BRANFORD, CONN.

Complete descriptive material of Lavite and Electric Furnaces is yours on request.

WIRE ANNEALING

You will be surprised at the results produced on your samples with Lavite Annealing.

## WHERE TO BUY YOUR WIRE


# Manufacturers of Fine Wire

## BARE FINE WIRES

| | |
|---|---|
| Bronzes, Various Grades | Phosphor Bronze |
| Copper | Pure Tin |
| High Brass | Commercial Bronze |
| Low Brass | Silver Plated Copper |
| 10%, 18%, 30% Nickel Silver | False Gold |
| Zinc | Copper Lahn |
| Lead | Gold Lahn |

Silver Plated Copper Lahn

## BRUSH WIRES

CRIMP AND STRAIGHT

| | |
|---|---|
| Brass | Nickel Silver |
| Steel | Phosphor Bronze |

Copper

## HUDSON WIRE CO.

Successors Royle & Akin

*Fine Wire Manufacturers*

Established 1902

OSSINING NEW YORK


**Leeds & Northrup Co.**, Philadelphia, Pa., employees held a minstrel show and dance in the ballroom of the Elks Club on Friday evening, Dec. 13th, despite the traditional superstition associated with that date to celebrate a plant addition. The latest addition increased floor space from about 2 to over 4 acres. Previous extensions took place in 1906, 1918, 1925 and 1927. The 1929 extension takes in the entire neighboring plant formerly occupied by the Atwater Kent Mfg. Co.

---

**Gilby Wire Co.**, 122 Riverside Ave., Newark, has completed a two-story addition and will install equipment for production of fine wires, including wire mesh manufacturing division, to cost more than $40,000.

---

**The Western Screw Mfg. Co.**, specializing in nuts and bolts has completed a new plant at 47th & Kedzie Ave., Chicago, which will give 50,000 sq. ft. of floor space. New equipment has been installed to make possible double the output of the present plant 4413 W. Kinzie St., where the company has been located for 12 years.

---

**The International Exposition of American Import Trade** will be held August, 1930 at the Grand Central Palace and will be an annual affair dedicated to the purposes of assembling under one roof raw, semi-finished, and finished products imported to this country for manufacturing and distributing purposes. The Exposition will give American importers, buyers and manufacturers the opportunity to get in direct contact with and receive first-hand information about foreign manufacturers, exporters, commission houses, etc., interested in making connections in the U. S. A. Capt. J. de Kahma-Kaufman is General Manager of the Exposition, with offices at 250 Park Ave., New York.

### New Acid-proof Lacquer for Steel Wire

A lacquer that is hammer-proof and acid-proof has been developed in Germany and applied to such products as steel pipe. According to Professor W. Trinks of Carnegie Institute of Technology, the lacquer, besides being virtually hammer-proof, withstands even boiling hydrochloric acid. The pipes to be coated are pickled, rinsed, dried and dipped in the lacquer, which is a phenol-formaldehyde condensation product; they are then baked and are ready for shipment. In places where pipes are cut, welded or threaded, lacquer is applied with a brush and baked with a blowtorch. There is only one thing wrong with this lacquer; namely, that the owners of the patent application ask for too much compensation for the rights in the U. S.

This lacquer is also being considered for structural material and promises to be a severe competitor to the new rustproof structural steels which contain copper and chromium. It is likewise a competitor to tin plate for cans, buckets, dishes, basins and so forth, and a competitor to zinc and lead, not only for pipes but also for roofing sheets. Lacquered sheets can be doubled without cracking the lacquer.

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### Electric Industrial Trucks Sell Steadily

November shipments of electric industrial trucks and tractors as reported to the Department of Commerce by leading manufacturers were 116, December 151, compared with 167 in October and 158 in September. For the 11 months the total was 1,866 compared with 1,313 for the same months of 1928 and for 12 months, 2,019 compared to 1,466 for the full 1928 year. The tractor type accounted for 162 in November, 174 in December, other types 1,571 and 1,685. Exports were 133 and 160 compared with 128 and 145 last year. Domestic sales appear very steady, with a slight peak in March, April, May and June.

**Dudlo Mfg. Co.,** Wall St., Fort Wayne, manufacturer of electric wire, coils, etc., has awarded general contract to Indiana Engineering & Construction Co., Central Building, for addition, 65x75 ft., to cost about $50,000 with equipment.

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**Tungsten Electric Co.,** Union City, N. J., has been formed to take over and consolidate International Wire Co., Inc., Callite Products Co., Precision Metal Products Co., Independent Contact Mfg. Co., all with plants at 540 Thirty-ninth St., Union City. New company is arranging for sale of stock to total $955,000, part of fund to be used to carry out merger and for expansion in output.

---

**Driver-Harris Co.,** Middlesex St., Harrison, N. J., manufacturer of wire products, will take bids for about seven two and three-story additions, to cost over $350,000 with equipment. J. A. Finegan, 776 Broad St., Newark, is architect.

---

**G. F. Wright Steel & Wire Co.,** 13 West Ohio St., Chicago, manufacturer of wire goods, wire cloth, etc., has leased four floors in building at 22 West Austin Ave., for new plant.

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**Bellevue Industrial Furnace Co.,** 2971 Bellevue Ave., Detroit, has plans for one-story addition, 80x165 ft., to cost about $50,000 including equipment. C. L. Phelps, Detroit Savings Bank Bldg., is architect.

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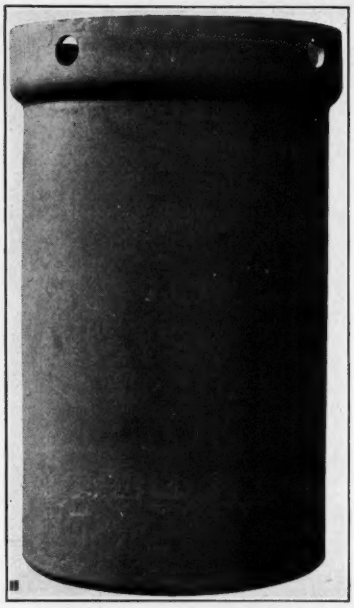
**General Cable Corp.,** 420 Lexington Ave., New York, has purchased plant and business of Peerless Insulated Wire & Cable Co., Pennington, N. J., and will consolidate with its Standard Underground Cable Co. division, with main plant at Perth Amboy, N. J. Acquired plant will be continued as branch works. Company has expansion program under way at Perth Amboy, including additional manufacturing units. Part of works at Pittsburgh will be removed to this location.


**Standard Forge Fire-Hammer Welded ANNEALING POT**



**THESE POTS**

can be furnished in any practical size or shape.

With either single or double bell offset at top and with or without lifting holes as shown.

---

FOR

Annealing Pots to Fit Your Special Needs

WRITE TO

**THE COLUMBIANA BOILER COMPANY**
**Columbiana, Ohio**

---

The only concern SPECIALIZING in the manufacture of

**Wire Drawing Soaps**

SINCE 1892

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**THE J. T. ROBERTSON CO., INC.**
SYRACUSE, N. Y.
Ask about our special soaps for use with the new alloy dies.

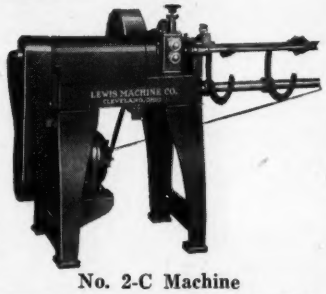
---

**"CUT YOUR CUTTING COST"**

LEWIS

**Motor Driven**
**WIRE STRAIGHTENING AND CUTTING MACHINES**

**Efficient V Belt Motor Drive, Timken Roller Bearing Equipped. Built to endure hard service. Sizes up to ½" diameter wire.**



**No. 2-C Machine**

**LEWIS MACHINE CO., 1592 E. 24th St., Cleveland, Ohio**

# Professional Directory

**Listing in the Professional Directory is recommended to all engineers, engineering and construction firms and consultants seeking business with wire mills or plants utilizing wire in any form.**

**W. H SPOWERS, JR.**
Consulting Engineer
551 Fifth Ave., N. Y. C.
*Specializing in Galvanizing*
Plants Designed and Installed
Vanderbilt 7395 Practical Engineering Advice

**Broden Construction Co.**
*Wire Mill and Cold Rolling Equipment*
10255 Harvard Ave.
CLEVELAND, OHIO

**A. WALDECK & COMPANY**
WIRE GAUGES AND
FINE STEEL WIRE DIES
7607 Broadway, Cleveland, Ohio

**ANNEALING SALT BATHS**
FOR
Steel and Copper Wire
Inquiries Solicited
European Color & Chemical Co., Inc.
WEEHAWKEN, NEW JERSEY

**Wire Expert Foreman**
First Class Experience in the Manufacturing of Krupp Chromic wire, also for all kinds of other materials down to the finest sizes. Wishes position as foreman or manager. Merit of production guaranteed. Rose. Wire & Wire Products, 551 5th Ave., New York, N. Y.

# PATENTS
## TRADE-MARKS
## SERVICE

Without charge or obligation, we will inform you on any questions you may put to us touching on patent, trade-mark and copyright law. You may ask: "Should I protect myself by patent, or register under the trade-mark or copyright laws? What kind of a patent should I obtain?" and many other questions that may occur to you. These are vital points to consider and questions will be cheerfully answered.

**Evidence of Conception**

Before disclosing your invention to anyone send for blank form "EVIDENCE OF CONCEPTION" to be signed and witnessed. As registered patent attorneys we represent hundreds of inventors all over the United States and Canada in the advancement of inventions. The form "Evidence of Conception," sample, instructions relating to obtaining of patents and schedule of fees sent upon request.

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Originators of forms, "Evidence of Conception."

**FOR SALE**
USED DIAMOND DIES
Size .010" to .012" diam. Address offers, Box 101, W. & W. Prod. 551 5th Ave., N. Y. C.

**FOR SALE**
WIRE NAIL MACHINES
Made by National Machine Co., Tiffin, Ohio, practically new. Sizes No. 1½, 2, 3, 4, 5, as desired. Information Box "B", Wire & Wire Products.


### Canadian Plant Makes Large Armored Cables

Tower and control cable with interlocked flexible metal armor for installation without a conduit in central station, industrial and other interior wiring has been announced by the Canadian General Elec. Co. Ltd. Cable provided with the armor can be run along walls, between partitions and under floors without the use of ducts, and the construction of the armor is such that turns in the cable can be made easily.

Varnished cambric and rubber insulated, either taped, braded or leaded, and paper-leaded cable can be supplied with the armor, in lengths up to 1,000 ft. for cables with an overall diameter less than 1 in. and in lengths up to 2,000 ft. for cables with an overall diameter between 1 and 3 in. The cables can have any number and combination of conductors, and any outside diameter up to 3 in.

The armor is a layer of overlapping and interlocking metal tape, either galvanized steel or aluminum, so applied that the cable is always mechanically protected under reasonable installation conditions. The steel armor is suitable for most installations; the aluminum tape is for use where a non-corroding armor is required, and for single conductor cable carrying alternating current where the magnetic effect of steel is undesirable.

### New Type Phonograph Needle Uses Less Wire

Eliminating the necessity of frequent changes of needles on the phonograph, a permanent needle now is on the market which, the makers claim, preserves the records and renders loud or soft music as desired. The needle is inserted in the sound shaft like the ordinary kind, says a writer in *Popular Mechanics*. Near its end is a small adjustment screw and, out of the shorter shaft, protrudes a fine steel wire corresponding to the point of the

ordinary needle. Lengthening or shortening this protruding part regulates the sound, and a range of one millimeter (one twenty-fourth of an inch) represents the difference between loud and soft music. The wire fits into the play groove, distributing friction equally instead of boring into the groove or scraping along the sides. A point too long or bent may be broken off the wire, after which it plays as before. The permanent needle is said to play 50,000 records or more without any attention other than adjusting it for pitch.

### New Device Measures Porsity of Fabrics

The Bureau of Aeronautics of the Navy Department, in cooperation with the Bureau of Standards, has developed a special apparatus to calculate the amount of air passing per minute through a fabric. The chief use of the device is to aid in selection of proper cloth for various purposes, the suitability of parachute materials, for example, depending in large part on their porosity. A possible use for this would lie in the checking up of wire cloth, Fourdinier cloth, cloth for dandy rolls, etc.

### Research Has A Real Value

The practical value of research is pointed out by John Liston in the *General Electric Review* for January. He states that more than 20% of the income of the General Electric Co. in 1929 represented electric apparatus which, as recently as a decade ago, was either unknown or of negligible importance commercially, and which has been developed through research during recent years.

**The Bancroft & Martin Rolling Mill Co.**, Portland, Me., manufacturer of reinforcing bars, is making improvements at its South Portland plant. In addition to new office and yard arrangements, the company will install a warehouse, garage, and later a gasoline and oil distribut-

"PREMIER"
Trade Mark Reg. U. S. Pat. Off.

**Diamond Die USERS Report**

- - - - *Less interrupted production*
- - - - *Less repair work*
- - - - *Less replacements*

You, too, can get these same results by using "Premier" Diamond Dies—The dies that draw true to expectation any metal in any size suited to Diamond Die Drawing.

*Write us for further information.*

**DRIVER-HARRIS COMPANY**
HARRISON, NEW JERSEY
Chicago - Detroit - Morristown,N.J. - England - France
*Alloy Makers since 1899*

**WIRE DRAWING**
Machinery and Equipment
ROD FRAMES—16" FRAMES AND 8" FRAMES—TAKE-UP FRAMES
WIRE POINTERS—PULLER TONGS
General Castings For Wire Mill Use
CIRCULARS ON REQUEST
**E.J. SCUDDER FOUNDRY & MACHINE CO.**
TRENTON, N.J.

***DIAMOND DIES***
OF QUALITY
PERFECT PERFORMANCE AND DURABILITY
SELECTED DIAMONDS—GUARANTEED WEIGHTS
MANUFACTURED BY
**Atlas Wire Die Company**
100 Fifth Avenue New York

# URDIKA

## ELMARID

*The most improved metal composition die.*

Manufactured in sizes ranging from .020" to .250"

STEEL SET

## DIAMOND DIES

Highest Quality

Accurate Size Smooth Draw

# URDIKA
## WIRE DIE WORKS

125 Fulton Street New York City


ing plant for the operation of its rolling mill.

---

**Ohio Nut & Bolt Co.,** Berea, Ohio, has plans for one-story addition, 45 x 160 ft., to cost about $45,000 with equipment. John W. Bagley, 1706 Euclid Ave., Cleveland, is architect.

---

**San Francisco Galvanizing Works, Inc.,** 1176 Harrison St., San Francisco, has awarded general contract to Sorensen & Haggmark, 2652 Harrison St., for extensions and improvements to cost about $25,000.

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**Wrought Washer Mfg. Co.,** Milwaukee, has moved its subsidiary, Universal Tool & Die Co., into new two-story building at Barclay and Washington Sts., costing $85,000 with new equipment, and will invest $500,000 in rebuilding plant formerly occupied by Beaver Mfg. Co., Chase and Oklahoma Aves., for rerolling mill, raw material storage and shipping facilities.

---

**Fort Wayne Rolling Mills Corp.,** 1701 McKinley St., Fort Wayne, has plans for a one-story unit, 60 x 250 ft., to cost about $100,000 with equipment. Abel-Howe Co., 53 West Jackson Blvd., Chicago, is engineer.

---

**Baltimore Copper Smelting & Rolling Co.,** Canton, Baltimore, has awarded general contract to Herbert J. West, Knickerbocker Bldg., for a one-story addition, to cost about $35,000 with equipment.

---

**Driver-Harris Co.,** Middlesex, St., Harrison, N. J., manufacturer of wire products, has authorized construction of power plant for new two and three-story factory group, to cost about $40,000 with equipment. Entire project will cost over $350,000. J. A. Finegan, 776 Broad St., Newark, is architect.

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**Keystone Steel & Wire Co.,** has declared a quarterly dividend of 50c on common stock, placing issue on $2.00 annual basis, against $3.00 heretofore.

# BUYERS' GUIDE

**For more complete information, consult the annual Directory, Index & Buyers' Guide.**

**ANNEALING SALTS**
European Color & Chemical Co., Weehawken, N. J.

**ANNEALING POTS**
Columbiana Boiler Co., Columbiana, O.

**BAKERS**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**CLEANING COMPOUNDS**
Oakite Products, Inc., N. Y.

**CRANES**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**DIAMONDS—Industrial**
Abr. Levine, New York

**DIES—Chilled Iron**
Waterbury Wire Die Co., Waterbury, Ct.

**DIES—Diamond**
Atlas Wire Die, Co., New York, N. Y.
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Wire Die Works, N. Y.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Globe Diamond Die Corp., New York
F. Krause & Co., Inc., Jersey City, N. J.
Master Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Works, New York.
Waterbury Wire Die Co., Waterbury, Ct.

**DIES—Repairs & Re-Cutting**
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Wire Die Works, N. Y.
Cochaud Wire Die Corp., New York.
F. Krause & Co., Inc., Jersey City, N. J.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Wks., N. Y.

**DRAWING COMPOUNDS**
Oakite Products, Inc., N. Y.

**FLUXES—Soldering**
Kester Solder Co., Chicago, Ill.

**FURNACES—Wire Annealing**
Bellis Heat Treating Co., Branford, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

**GALVANIZING ENGINEER**
W. K. Spowers, Jr., New York, N. Y.

**GALVANIZING LADLES, PANS, POTS**
Columbiana Boiler Co., Columbiana, O.

**GAUGES—Wire**
A. Waldeck & Co., Cleveland, Ohio.

**LATHES—Die Reaming**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

**LUBRICANTS—Wire Drawing**
R. H. Miller & Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

**MACHINERY—Armoring (Cable, Wire, Hose)**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Braiding**
Mossberg Pressed Steel Corp., Attleboro, Mass.

**MACHINERY—Bundling**
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson.

**MACHINERY—Cable**
Watson Machine Company, Paterson, N. J.

**MACHINERY—Cutting**
American Insulating Mach'y Co., Phila., Pa.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

**MACHINERY—Coiling**
Broden Const. Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Chain Making**
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Forming**
Sleeper & Hartley, Inc., Worcester, Mass.
M. D. Kilmer & Co., Cleveland, Ohio.

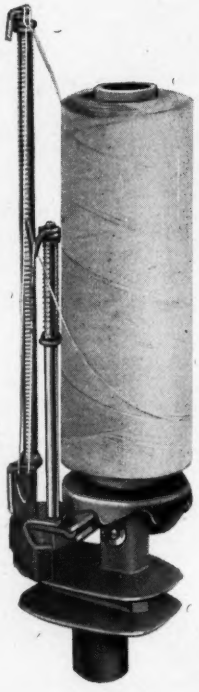
**MACHINERY—Galvanized Wire**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Insulating**
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.

**MACHINERY—Measuring Wire**
New England Butt. Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

**MACHINERY—Nail**
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Panning**
American Insulating Machinery Co., Phila.

*Patented*

# Mosspeed Braider Carriers

*They Reduce Braiding Costs*
*Produce a Firmer Braid*
*and Save in Yarn*

MAYPOLE braiding machines may be operated up to 75% faster when Mosspeeds are used. Spring take-up insures greater firmness in the braid. A firm braid requires less yarn than a loose braid which lacks uniformity. Mosspeed Braider Carriers thus insure a saving in yarn and a better product at a lower cost. We can supply them for any Maypole type of braider. Ask us for full particulars.

**Furnished with or without special steel tube cover for take-up spring.**

**MOSSBERG**
**PRESSED STEEL CORP.**
**Attleboro --- Massachusetts --- U. S. A.**
**Greenville, S. C. Dallas, Texas**

Selson Engineering Co., Ltd., 26-28 Charles St., London, E.C.I.

# BUYERS' GUIDE, Continued

**MACHINERY—Magnet Wire Enameling**
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Pointing**
Morgan Construction Co., Worcester, Mass.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

**MACHINERY—Rivet**
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

**MACHINERY—Screw Wire**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Spooling**
American Insulating Machinery Co., Phila.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

**MACHINERY—Spring Making**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Staple**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Straightening**
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., Cleveland, O.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Stranding**
American Insulating Mach'y Co., Phila Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Swaging**
Sleeper & Hartley, Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrell Foundry Machine Co., Waterbury, Conn.

**MACHINERY—Taping**
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt. Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

**MACHINERY—Testing**
Riehle Bros. Philadelphia, Pa.
Henry L. Scott Co., Providence, R. I.

**MACHINERY—Trolley Wire**
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

**MACHINERY—Winding**
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Wire Drawing**
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
The Torrington Manufacturing Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

**MACHINERY—Wire Rope**
New England Butt. Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

**NEUTRALIZING COMPOUNDS**
Oakite Products, Inc., N. Y.

**PATENTS**
Lancaster, Allwine & Rommel, Washington, D. C.

**POTS—Annealing**
Columbiana Boiler Co., Columbiana, O.

**REELS—Annealing**
American Pulley Co., Philadelphia, Pa.
Apco-Mossberg Co., Attleboro, Mass.
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**SOAPS—Wire Drawing**
R. H. Miller Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

**SOLDER**
Kester Solder Co., Chicago, Ill.

**SPOOLS—Wire & Cable**
American Pulley Co., Philadelphia, Pa.
Apco-Mossberg Co., Attleboro, Mass.
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**TRUCKS**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**WIRE—Various Kinds**
Hudson Wire Co., Ossining, N. Y.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.


WATERBURY-FARREL

UPRIGHT ROLL

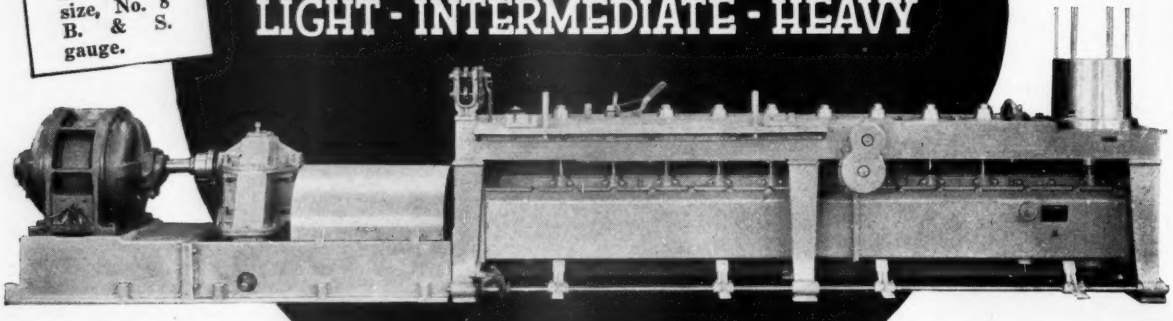
*Continuous*

WIRE DRAWING MACHINES

LIGHT - INTERMEDIATE - HEAVY

Illustration shows No. 3 intermediate 10-die machine, motor drive. Starting size, No. 8 B. & S. gauge.

Straightaway construction—Forced feed lubrication. Ball bearings throughout.



WATERBURY-FARREL FOUNDRY AND MACHINE COMPANY

HOME OFFICE AND WORKS:
Cottage Place, Waterbury, Conn.
U.S.A.

WESTERN SALES OFFICE:
736 Bulkley Bldg., Cleveland, Ohio

# THE WATSON MACHINE COMPANY

ESTABLISHED 1845

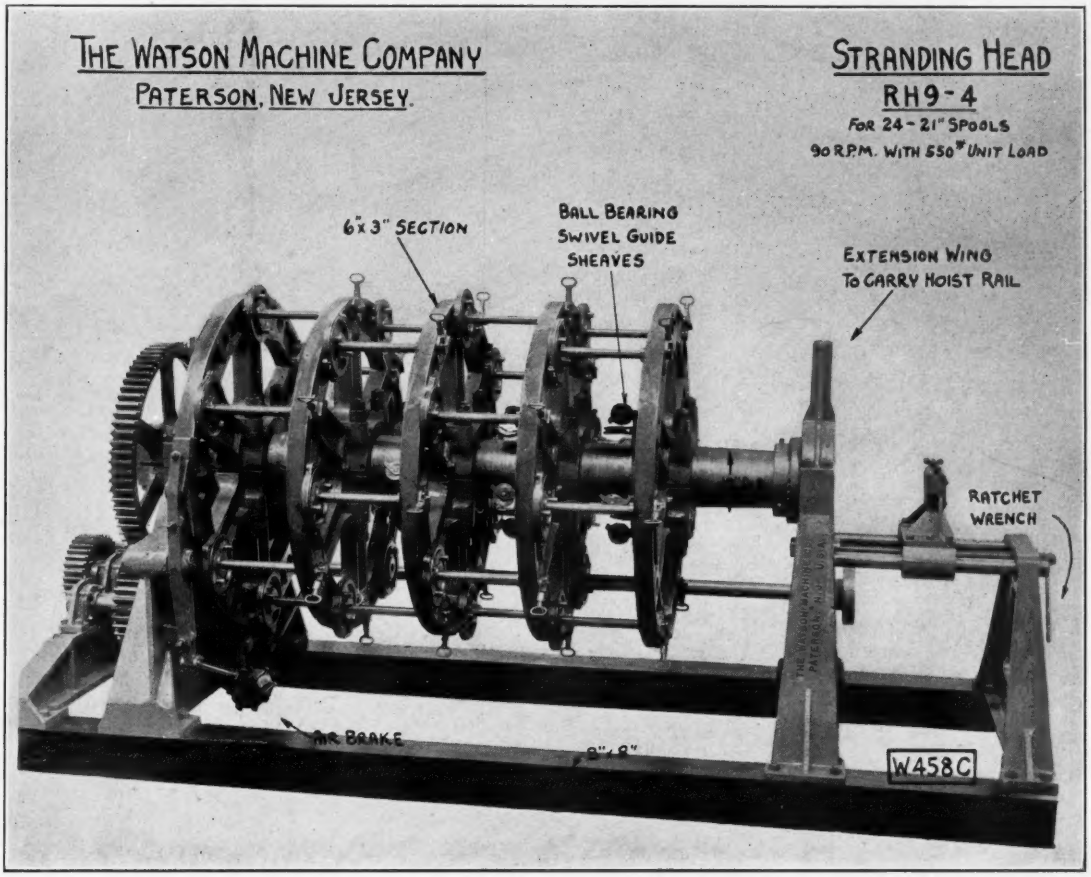
PATERSON, NEW JERSEY, U. S. A.

## ENGINEERS - FOUNDERS - MACHINISTS

### RIGID FRAME HORIZONTAL STRANDING HEADS

For the Stranding of Soft Copper

**Standard Designs for 100, 250 and 500 pound spools for 6, 12, 18 and 24 Spool Heads**




**Power, Floor Space and First Cost of machines approximately ⅔ of Planetary Type, with Production Greater.**

**Maintenance cost practically nil, due to absence of parts moving respective to Rotor Body.**

**Air Brakes—Rapid Tandem Threading through shaft bore—Ball Bearing Guide Sheaves —Rotor carried on Main Ball Bearings. All Roller Bearing Drive.**

**Spool Friction permanent on Rotor—Spindles not removed from Rotor when loading in all circles except final one.**

## ELECTRICAL WIRE AND CABLE
## WIRE ROPE and CORDAGE MACHINERY

Morgan Double-Decker can be used effectively for single draft by drawing through upper die or by replacing block and die box with interchangeable units. Block can be arranged to tie in with any stripping and handling system employed.

Complete catalog upon request.

MORGAN CONSTRUCTION CO., WORCESTER, MASS.

**European Representatives:**

**International Construction Co., 56 Kingsway, London, W. C. 2, England**
**Davy Bros., Sheffield, England**

# MORGAN
## WORCESTER
Engineers and Manufacturers